2007 Volume 4 Issue 2

HOT DIP GALVANIZING TODAY

HOT DIP GALVANIZERS ASSOCIATION Southern Africa

31

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

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Front Cover: *A kaliedoscope of photos showing the parallel Athlone Stadium Arches at night, some seat brackets and handrails at ABSA Stadium in KZN, a Cape Town Winery and some unnecessary concrete spalling.*

Hot Dip Galvanizing – Adding value to Steel

Executive Director's Comment

As we approach half way for the year, it is with great pleasure we can report on a positive upward trend in the hot dip galvanizing industry. Our members are busy, which means the Association is busy with technical advice to the corrosion industry as a whole and more specifically to the users of hot dip galvanizing and Duplex coatings in applications to facilitate corrosion control of carbon steel.

Associated with this upward tend we are again reminded of the continued need for the transfer of knowledge and of education relating to the application of hot dip galvanizing and Duplex coatings for corrosion control. The many end users and specifiers of these two methods of corrosion protection clearly recognize this need for improving understanding of the process as we have witnessed a dramatic increase in attendees on our two day Hot Dip Galvanizers Coating Inspectors courses. Full details of this "tough" two day Inspector's course are highlighted in the magazine and on our web site. The course has been specifically designed for inspection of fabricated steel prior to galvanizing as well as post galvanized product complying with SANS 121 or SANS 32. The good news for our professionals is that two (2) Continued Professional Development (CPD) points are to be achieved by attending the course.

Perhaps on a less positive note, we report that South Africa's Mr. Galvanizer, Mr. Walter Barnett has decided to hang up his trusted zinc thickness measurement instrument and to retire. Without doubt Walter will be missed, but we have arranged that he retain his cell phone in order that we can continue to consult him whenever the need arises. Walter, I am positive, would welcome any telephone calls from the industry, if not for advice on corrosion or hot dip galvanizing, but simply to say hello and renew past friendships.

Bob Wilmot

Note from the Editor

Driving on the highways in and around Johannesburg these days can meet with some stressful challenges and time constraints, so because I live in the west and work in the east, I generally drive through the suburbs.

The route that I use is made up of many tree-lined streets that at this time of the year have a beautiful mass of autumn coloured leaves varying in shades of red, brown, green and yellow.

Now pessimists would say that Autumn is not a great time of year because it precedes Winter, whereas the optimists would look at the beautiful side.

Autumn has and will always fulfil a vital function; it is certain and predictable, to many it is beautiful and will always be around.

This is how I see our industry; in spite of the fact that the coating has been around for about 170 years and although relatively old in comparison to the typical product life cycles typical of today, the hot dip galvanized coating still fulfils a vital function; it is certain and predictable; it is beautiful to many and will always be around. In fact the more industrialised companies clean up industrial pollution, the longer hot dip galvanizing will last!

Already a typical hot dip galvanized coating applied to structural steel will, in 90% of South Africa (excluding micro-chemical environments) provide a service free life of about 40 to 50 years.

Features for this issue include a look at Stadiums starting with an article "2010 and all that...", also the innovative method of hot dip galvanizing huge structures used on the new Athlone Stadium arch. We also look at the durability of the hot dip galvanizing specified for the seat brackets and handrails in the early eighties at the ABSA stadium in KZN.

We discuss the Constantia Winery in Cape Town; the change from paint to hot dip galvanizing and compare what was specified to what was supplied in terms of fasteners.

Heat Exchangers and Industrial Cooling Fans are looked at while we invite specifiers in Cape Town to our seminar on Hot Dip Galvanized Reinforcement for concrete.

Finally, together with an article on global perspectives of hot dip galvanizing by the IZASA, we present the "World of Hot Dip Galvanizing Around Us".

Under **Duplex Coatings**, a reputable paint applicator discusses "Preparing Hot Dip Galvanized Steel for Painting".

Education and Training, expands on our certificated coating inspectors course, an essential requirement in any coating inspectors portfolio.

The **Coating Report** involves a tubular mast for Eskom and discusses the importance of understanding how to interpret the requirements of taking coating thickness readings in terms of SANS 121 (ISO 1461).

We provide some feedback on our up and coming annual Awards Event and the fun had by all at our golf day.

Other regular articles include **Misconceptions**, where specifications that call for graded steel expect a normal hot dip galvanized coating thickness; **Walter's Corner** discusses, "How long does hot dip galvanizing last?"

Our **Guest Writer**, relates Slime Mould to company mergers, acquisitions and unbundling.

Our **Personality Profile** is architect Louis van Loon, who because of an extremely colourful life provides us with a most interesting profile.

Some of the members update us with their company news, in **Members News**.

Should a reader wish to express an opinion or provide us with an article, kindly contact me – enjoy the magazinc.

Terry Smith

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We are pleased to announce that we have four additional sponsors (other than Eskom) for this years event: Duplex Coatings, Galvrite Galvanising, Kingfield Equipment and Robor Galvanizers.

This prestigious Black Tie function will be held at
Sky Raiders, Hangar 41 / 42, Rand Airport, Germiston at 18h30 for 19h00, on the 31st August 2007.

The MC will be Abbott & Crabb, who will entertain you throughout the evening. Dave Abbott and Henry Crabb's unique blend of comedy and music has had audiences laughing and singing from Cape Town to Lusaka, Johannesburg to Swakopmund, Durban to... well just about anywhere there are people (and in some places where there aren't any)!

The cost of the event will be R450.00 per person (excluding Vat). Table bookings are welcome – each table will seat 12 people, however we can take bookings for any amount of people.

Should you wish to reserve your seat at what we promise to be the best Awards evening to date, kindly contact Saskia on (011) 456-7960 or hdgasa@icon.co.za

2010 and all that...

At 12h21 on the 15 May 2004, we heard that South Africa would host the 2010 FIFA World Cup. After the jubilation and celebrations the size of the task ahead became clear to us all. Numerous 'leaks' on dramas, budget overruns and delays have bombarded us all over the past year or so However, what is clear is that the Engineering Industry is to be stretched to the limit by the additional work provided as a result of hosting the World Cup. Soccer is the world's number one spectator sport.

The stadium requirements have been defined and can easily be summarised:

Five new stadiums are to be built. Outside of Nelspruit the Mbombela Stadium will be built with a capacity of 40 000. The Port Elizabeth (Nelson Mandela) Stadium will in fact be built on the banks of North End lake and have a capacity of 50 000. The new Greenpoint Stadium in Cape Town (capacity 68 000) will be built over the demolished old stadium. In Durban the King Senzangakona officially known as the Moses Mabhiba stadium (capacity 70 000) is being constructed. Finally, the Peter Mokaba Stadium is being built in Polokwane and have a capacity of 45 000.

Initial reports also had two other stadiums listed. These were the Kimberley stadium (with a capacity of 40 000) built over the old De Beers Stadium and the Rainbow Junction Stadium, in Pretoria, with a capacity of 41 000. This was to be built by a private initiative to be funded by San Grato Investments, in conjunction with the Sinovich family. Both of these stadiums have disappeared off the 2010 radar screen.

Other venues to be used will utilise upgraded facilities at:

- Soccer City, Johannesburg (estimated upgrade cost R212m,

which will include the environs and approaches).

- Ellis Park, Johannesburg (estimated upgrade cost R38m, mainly for additional seating). However, an estimated R300m+ is to be spent n upgrading the area and providing additional lighting and street furniture.
- Vodacom Park (Free State) Stadium in Manguang, Bloemfontein (upgrade cost R41m, mainly for additional seating and a roof). Little redevelopment is occurring near the stadium but some city transport improvements are under consideration to provide for better links between rail and bus services.
- Securicor Loftus, Pretoria (upgrade cost R16m for general improvements)
- Royal Bafokeng Sports Palace, Rustenburg (upgrade cost R12m, mainly for additional seating). However, further development near the stadium, to include enlargement of the Sports Stadium Complex to provide additional pedestrian and road access, are due for completion by October 2008.

Initial reports indicated upgrading of the following facilities:

- Oppenheimer Stadium, Orkney (upgrade mainly for additional seating)
- Newlands, Cape Town (estimated upgrade cost R16m, mainly for seating)

The required additional infrastructure development to support the 2010 events are broadly what Dany Jordaan, as CEO of South Africa's 2010 Soccer World Cup local organising committee, calls the legacy that will be left after the event. These include not just the park and amenity areas surrounding the venues but those remote from them such as the capacity extensions at airports.

Some details of the new stadiums are:

Starting with Greenpoint, the budget matter has become legendary. However, agreement has been made between the City of Cape Town and the Murray and Roberts/WBHO Joint Venture to an amount of R2.68bn. During April the base layer was strengthened to facilitate laying of the stadium foundations. The whole Greenpoint Common is to be reconfigured providing for a major sports and recreational area.

Soccer City, Johannesburg.

The Moses Mabhiba Stadium in Durban is being constructed by the Group Five/WHBO/Pandev Joint Venture at a budget of R1.6bn. Piling has been underway for some time with 23 000 tonnes of concrete, 330 tonnes of steel and 1 900 piles in place (May 2007). The two arches at the south

continued on page 6...

Free State Stadium.

end are complete with the north end arch 50% complete. It is estimated that some 2 000 people will be working on the stadium site by the end of the year.

The Mbombbela Stadium in Nelspruit will be built by a Joint Venture between French Contractor Bouygues TP and South Africa's Basil Read at a cost of R920m. The completion date for the new sports complex has been set for early 2009.

Foundation pouring for the Peter Mokaba Stadium in Polokwane started in March. According to Project Manager Teboho Nchapha of Seloane Consulting completion of the project is due in March 2009. The R716m contract was recently awarded to a consortium with M&R and WBHO as leading contractors.

In Port Elizabeth, the new multi-purpose stadium will be constructed at the Prince Alfred Park on the banks of the North End Lake. The R1.1bn stadium will be constructed by a joint venture between South African construction company Grinaker-LTA and the Netherlands' Interbeton. HBM Stadien- und SportstOttenbau GmbH, a specialist stadium construction company will also be part of the consortium. They were involved with stadium construction for the 2006 soccer World Cup in Germany.

Of the remaining venues, Soccer City in Soweto has to be mentioned. It will host the Opening and Closing events.

The contract for the revamping of the stadium was granted to Grinaker-LTA Construction, a subsidiary of JSE-listed The Aveng Group, in a joint venture with Interbeton bv, part of the Royal BAM Group from Holland. In addition, redevelopment of the area will be carried out. Although no major construction work is envisaged, Robert Bathke, from the Johannesburg Development Authority (JDA), is the development manager of the project to provide a sports and recreation hub.

In December of last year, deputy Finance Minister, Jabu Molekti, assured the press that all the 2010 World Cup venues would be completed by December 2008. The Confederations Cup is regarded as a test-run for the World Cup, and is due to take place in 2009. The Confederations Cup is an eight-team competition which will feature 2006 World Cup champions Italy, South Africa as the 2010 hosts and the winners of the next European, South American, Conacaf, African, Oceania and Asia Championships. The following venues have been earmarked to host this event – and by definition should be completed – Soccer City, Ellis Park, Loftus, Royal Bafokeng and the Free State.

Global experience of Hot Dip Galvanizing in Sports Stadiums

Looking at the vast number of sports stadiums world-wide, a simple list of where hot dip galvanizing has been used would not really do justice to how it enhanced the use of steel or provide background on why it was used. As a result a few examples will be taken on the use of hot dip galvanizing in sports complexes and their surroundings to highlight the local opportunities for the industry.

Moving back just 4 years, I am sure that we all remember the stadium with the large cube in the centre (often casting a shadow and blocking good camera lighting if the truth were told). This stadium was Frankfurt's Waldstadion. The majority of stadiums used in Germany were steel structures and hot dip galvanizing featured strongly.

Prize-winners in Galvanizers' Associations Hot Dip Galvanizing Awards for the past two years have included stadiums.

The large cube in the centre of the Frankfurt's Waldstadion, the steel of which was largely hot dip galvanized, often interfered with the camera's view.

In 2006, a prize winner of the UK's GA Award was the redevelopment of the Vauxhall grandstand at the Oval cricket ground in London. The ground was originally built in 1845 (8 years after Sorel registered his patent for hot dip galvanizing). The redevelopment plan consisted of demolishing the old stand and replacing it with a new 4-tier stand, roof and living screen. The living screen is located between the ground and the new stand forming the public façade of the building. It is 200m long, rises to 20m from 15m at the ends. The main structure is formed from a combination of hot dip galvanized steel sections, the most prominent being a series of curved galvanized steel tusks clad in timer with a stainless steel trellis spanning between the tusks to support the establishment of a permanent planting display.

In 2005, a prize winner of the German Galvanizers' prize was the AWD-arena in Hanover. Built using the existing stand but using innovative design to provide for greater capacity, safety, even pitch longevity and the construction of a hanging roof structure it was this roofing system that gained the prize. The stadium roof has been constructed entirely from steel and its form has been likened to external and internal spoke-wheels. Hot dip galvanizing was used as corrosion protection, in particular for all steel components, which are exposed to a specially high mechanical stress. This stadium was considered to be one of the most outstanding of the 2006 World Cup stadiums.

A similar roof design was used for the Tennis Stadium and the Homebush Bay Olympic Park in Sydney. Specially built for the 2000 Olympics, the use of steel provided for a light-weight structure providing shade for 70% of the spectators. Hot Dip galvanizing was used through-out.

Just to take a detour, in 2002, this Association had a submission for its 2002 Industrelek Hot Dip Galvanizing Award in its Novel Category, the Senwamakgope multi-purpose sports centre. In the same year, the Architectural Category winner was the new West-side grandstand roof as part of the re-development of Athlone Stadium in Cape Town. In 2006, the East-side grandstand roof was completed using similar design and material principles.

As a final illustration of opportunities, although possibly opportunities lost, significant steel work has been used for the construction of stadiums for the Beijing Olympics. The main stadium, affectionately known as the Birds-Nest. The stadium was designed by Herzog & de Meuron who have collaborated with ArupSport and China Architecture Research and Design Group. Much information is available but in brief:

- The stadium will seat as many as 100 000 spectators during the Olympics, but this will be reduced to 80 000 after the games.
- The stadium is 330m by 220m wide, and is 69.2m tall.
- The 250 000m^2 (gross floor area) stadium is to be built with 36km of unwrapped steel, with a combined weight of 45 000t.
- The roof (313m x 216m) will be clad with ETFE panels. Some changes are currently envisaged due to budgetary issues although much has been supplied as Colorbond from Blue Scope Steel (Australia).

Site inspection indicated that galvanizing the actual structurals for the main stadium could have been difficult. As a result, the use of galvanizing appears as if it will be restricted to furniture (railings, barriers, entrance gates, lighting poles, etc.). However, opportunities still exist if the industry can galvanize itself into action. Opportunities for the industry will be presented by an official of the Beijing Olympics Committee at the upcoming Asia Pacific General Galvanizing Conference to be held in Beijing in September this year

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

Athlone Stadium east stand arch

In 2004 a number of considerable challenges were faced and met during the design and construction of the Athlone Stadium west stand arch. Not least of these was how to hot dip galvanize the structural steel triangulated shaped girder in modules longer and wider than the locally available bath size.

The design team, headed by Henk Lourens, Chief Architect of Cape Town at the time, had settled on an exciting design concept comprising a floating roof hanging off an imposing but elegant arch. The roof was supported by a three-dimensional tapered triangulated shaped girder of 16.5m long with a cross sectional size of 6.1m x 5.5m at the centre, spanning about 190m.

The arch, which was constructed from a number of varying diameter tubes, was anchored onto two large concrete pedestals, positioned at each end. Structatube 300, a graded structural steel tube to SABS ISO 1431, was used. The 35m long roof rafters were suspended from the main girder.

Henk Lourens specified hot dip galvanizing and a comprehensive paint system (Duplex Coating System) for the structure, insisting on a 15 year maintenance free warranty on the coating. However, the largest galvanizing bath in the country at that time (containing 407 tons of molten zinc) which was in Cape Town, would not accommodate the modular sizes of the arch. The project team had even considered building a special bath to suit the size of the sections, but the cost of this together with double or triple dipping that would have been required proved to be impractical. An alternative proposal had to be found if hot dip galvanizing was going to be specified.

Through consultation with the Hot Dip Galvanizers Association of SA, a concept which was new to the industry was put forward. All components were to be separately hot dip galvanized (after preparation) and then welded into position for subsequent coating by hot metal zinc spray at the weld area. The ends of each component to be welded were prepared by being coated with a masking liquid called "Galvastop". The application of this product allows the components to pass through the entire cleaning process including the zinc bath without the metallurgical reaction between molten zinc and steel taking place. The remains of the masking product are then easily removed by means of a wire brush, revealing a clean, zinc-free surface ready for welding. The components were then welded into position and the join areas were subsequently zinc metal sprayed.

The modular components were then transported to site for pre-assembly and final erection. The arch girder was erected approximately 38m above ground utilising four mobile cranes, in a single operation. Any mechanical damage to the paint coating was subsequently repaired after erection.

In November, 2006 Phase 2 (the east stand roof), was completed. The design of the 191.5m span was executed by Axis Structural & Civil Engineers. Henry Herring, senior partner of the firm explained the differences between the two structures, which required a full redesign from the similar looking west side roof.

"One of the major changes was the roof plate which hangs below the arch. This has a bigger area and comprises longer rafters", explained Herring. "Consequently the roof plate slope was increased to accommodate greater water flow from the north-west driven rain. Taking into consideration new calculations for wind load as well, the new arch therefore required larger circular hollow section top and bottom chord than the previous design".

The grade for the larger pipes used for the design was based on the API-5L X42 pipe made by Hall Longmore, having a guaranteed 289Mpa yield. Smaller profiles were Structatube 300 material.

When asked about corrosion protection, Henry Herring stated that this was achieved by hot dip galvanizing the steel and then covering the coat with a duplex paint system. The bolts, made from a 460Mpa- yield steel, were also hot dip galvanized. The system for preparing the weld sites remained the same as for Phase 1 (west side roof) and as the same steelwork contractor and weld teams were used, the concept proceeded without a hitch.

All joints were masked prior to and cleaned after hot dip galvanizing – resulting in successful structural welding.

End view of a completed section about to be lifted into position on site.

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AKZO NOBEL

Blue Bulls are "galvanized" into action at the dying moments and win the Super 14 final from the Sharks

Victor Matfield, captain of the Blue Bulls and winning side, proudly poses with the victors (excuse the pun) trophy, along with Germaine Hennop, daughter of Andre Hennop of PH Projects, a supporter of our industry."

Proud moments for all South African rugby fans having two significant South African rugby sides in the Super 14 final.

One of our members, Mike Book of Duplex Coatings cc who apart from watching the exciting final, also noted that the hot dip galvanized coating on the handrails and seat brackets looked good, even after many years of service.

The West side stadium according to Maintenance Manager Aslam Yusuf was built in the late fifties/early sixties and equipped with the hot dip galvanized components in the early eighties.

The following photos were taken on a visit to the stadium after the match, to evaluate the coating.

Where the plastic cover caps have fallen off the fasteners, the coating has failed. It is anticipated that the original fastener coating would have been zinc electroplated, providing significantly less corrosion protection than a hot dip galvanized equivalent.

The stadium on the West side.

The unpainted hot dip galvanized handrail at the press box.

Typical coating thickness on the handrail.

The hot dip galvanized seat brackets.

Coating thickness ranged from 117 to 146µm.

APOLOGIES – MAGAZINE No. 30

Hot Dip Galvanizing Today wishes to apologise to Lianru Galvanisers for not including their latest bath size. The 1.95m x 0.83m x 1.2m bath has been replaced by a 4.5mL x 1.3mW x 1.6mD bath.

Desere Strydom of Phoenix Galvanizing interviewed our previous Personality Profile, Busi Mpontshame and we omitted to acknowledge her, kindly accept our apologies Desere.

Duplex Coatings cc altered their email address and the advert in the previous magazine was not altered. Contact Duplex on mike@bulldogprojects.co.za. We apologise for this error, Mike.

Constantia Glen Winery

What was specified and what was supplied

The following account shows the importance of maintaining quality control on industrial construction projects, in order to check that the specifications laid down by the Specifiers and included in the Bill of Quantities have been adhered to.

In this case, a winery was being built in the Western Cape and the original specification required wire brush surface preparation, priming and painting of the structural steel to the winery building envelope. Due to the anticipated environment and atmosphere within the winery the consulting engineers, along with the contractor recommended that the steelwork be hot dip galvanized for enhanced durability and lifespan.

Based on minimum coating thickness for the various steel elements from SANS 121 and consultations with the Hot Dip Galvanizers Association of SA (HDGASA) on expected corrosion rates of the coating, an approximate lifespan for the structural steel was given. The cold formed lipped channel (CFLC) purlins and mezzanine floor rafters were the critical elements defining the least period to first maintenance, as they had the thinnest wall thickness (2.5mm). The other elements consisted of I-section beams and columns, H-Section columns, angle bracing members and circular hollow section (CHS) and T-section truss members. Along with the structural steelwork, all fasteners were specified as hot dip galvanized.

The client agreed to the slight increase in cost for the hot dip galvanized coating, knowing that it would be enhancing the maintenance-free lifespan of the steelwork. As a quality control measure, the consulting engineers requested that an independent inspection of the steelwork be carried out. These inspections were variously done by representatives from the HDGASA, Galvatech and Cape Galvanising.

All structural steelwork was hot dip galvanized with the veranda columns left unpainted. This was done in order to monitor the performance of the hot dip galvanized coating over the ensuing years.

They revealed that the fasteners were not hot dip galvanized but zinc electroplated and that the bulk of the CFLC purlins and floor rafters were supplied having been bent up from continuously hot dip galvanized sheet, coating class Z275 which has a nominal coating thickness of about 19 microns, as compared with the minimum 45-55 microns required by the general hot dip galvanizing specification, SANS 121 for the purlins and rafter members.

The consequences were that all accessible and exposed fasteners were replaced at the contractor's cost and the contractor was asked to pay a monetary guarantee in advance for possible future early maintenance of the purlins and rafters

The HDGASA has undertaken to monitor the corrosion rate of the coating for a number of years, to better predict the ultimate lifespan of the structure's corrosion protection. This will be done by taking coating thickness readings, annually at certain predetermined positions on some exposed and identified hot dip galvanized structural sections. See photos.

HI-TECH ELEMENTS

DESIGNERS AND MANUFACTURERS OF ELECTRICAL HEATING ELEMENTS AND SYSTEMS

One of the largest privately owned industrial heating manufacturers in Southern Africa, employing close to fifty people is Gauteng-based Hi-Tech Elements.

Hi-Tech Elements design, manufactures, installs and commissions specific plants to client requirements. As a total turnkey operation, the company has managed some very large galvanizing plants, as well as metal melting and holding plants and industrial powder coating plants. The company also designs and builds control panels associated with such plants.

Howford Manufacturing, a wholly owned subsidiary of Hi-Tech Elements specialises in industrial immersion heating and control with a range of heaters called The HotRod®. The range consists of standard stainless steel, titanium, vitrosol glass and Teflon heaters specifically designed for the metal coating and finishing industry.

Temperature measurement as well as liquid level probes and control in stainless steel, titanium and Teflon coating also form part of The HotRod® range. This range carries the CE mark of excellence worldwide on all its products.

A further acquisition in 2004 was a temperature management company called Eastern Controls. This company manufactures all the PT100 probes, thermo-couples and other temperature measurement devices as well as its own range of temperature controllers, both digital and analogue, with micro-processing and other functions.

In recent months Hi-Tech Elements has spent a further R3 million investing in an element filling plant. The ability to now manage quality control and produce goods in the shortest possible lead time has put the group in a league of its own. The company has also invested in an R&D facility and is ISO 9001:2000 certified.

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Fan manufacturer chooses hot dip galvanizing over paint for corrosion protection

One of the largest manufacturers and distributors of axial flow and centrifugal fans, Alstom Mechanical Equipment, has recently extended their distribution arrangements with Fläkt Woods AG of Switzerland, to become sole distributor in Southern Africa of their entire range of fans.

For many years, Mechanical Equipment has designed and manufactured Fläkt Woods axial flow fans from 315mm to 2 500mm, but the new agreement now pushes the size of the largest fan unit from 1 MW up to a power of 10 MW.

Three years ago, the company changed their corrosion protection philosophy and made a decision to move away totally from paint to hot dip galvanizing. There were several immediate benefits to be felt with this move.

From a space saving perspective, they were able to get rid of the treatment and paint plant. On the cost saving side, closing the chemical treatment plant was an immediate saving in chemicals and electricity. They were also able to downsize from two to one spray booth, which is now only used for touch-ups on non-galvanized components such as fan impellers and motors. From a storage point of view, fabricated components can now be stored outside, as they have been hot dip galvanized. Finally, where handling is concerned the need to touch-up has been reduced considerably due to the robustness and abrasion resistance of the hot dip galvanized finish.

At first, there was some resistance from customers towards the move to hot dip galvanizing, especially from the mines. However they have now accepted that the finish is far superior, as can been seen in the fact that products which come back from the mines for maintenance or repair are in a far better condition than their painted counterparts. "We see the mines now demanding a hot dip galvanized finish", comments General Manager, Craig Johnston.

There has been some concern with regard to repairs on hot dip galvanized products where cutting and welding is required, but the Hot Dip Galvanizers Association of SA has recommended a zinc rich epoxy, such as "Zincfix". This is a two component product, that is easily mixed and applied with excellent application and durability results.

Johnston says that they have great service from the industry through their dealings with "Robor Galvanizers" as their galvanizer. Robor collect and deliver a truckload of components twice a week, leaving a trailer on site to be loaded and replacing it when the full trailer is collected. In this way, Mechanical Equipment is able to achieve a turnaround time of approximately three days for their finished components.

Building the future: water sustainability, durability and economics

Black Rock Water Reclamation Plant, Barwon Water – Victoria, Australia

Water is an important issue currently facing Australia. Water authorities are working to play their part in minimising the impact of development on future generations.

Designers are treating water treatment and reclamation plants holistically in terms of their contribution to the sustainability of wider society: they gather waste water; treat it; and then produce an added value end product in an environmentally and economically sustainable manner.

The process should be as environmentally friendly as possible and this includes reducing or totally removing the use of chemicals and other materials. Secondly, the infrastructure should be robust, utilising materials that are readily available, durable, require minimal maintenance and are, ideally, recyclable. The Black Rock Water Reclamation Plant meets these criteria. It incorporates the use of hot dip galvanized steel to be sustainable, durable and low maintenance.

The Black Rock Water Reclamation Plant

The plant commenced operation in 1989 and was further upgraded in 1995. About 55ML of sewage daily is delivered from both domestic and business sources.

A key part of its strategy is to ensure the use of reclaimed water is sustainable and commercially viable. Barwon Water believes that reclaimed water from the reclamation process has great potential for commercial use.

Initially, the solids and excess sludge are removed from the water. The remaining effluent then flows to the facility's selector tanks and mixed with recirculated "liquor" (activated sludge) from the aeration tanks. This "liquor" is rich in the bacteria that digest the sewage.

Air is pumped via hot dip galvanized pipes into the tanks for 2 hours to encourage the growth of the bacteria. The aeration then stops and the sludge settles for an hour. This cycle continues until at the end of the process, the water left in the decanting tank is ideal for agricultural and horticultural purposes. The process is appropriately called IDEA: Intermittently Decanted Extended Aeration. It uses natural biological processes where the bacteria "eat" the organic matter in the sewage and no environmentally harmful chemicals are used.

Holding tank – note the surf beach in the background.

Galvanized pipe facing both the corrosive effects of the effluent and bird excrement!

Piping delivering hot air to aeration tanks.

The water is then supplied to commercial projects including a flower farm, lucerne farm, potato farm, turf production company and tree plantations.

Corrosion protection

Water treatment plants are highly corrosive and only the most robust materials can survive. The Black Rock Plant judiciously uses a mix of hot dip galvanized steel, stainless steel and aluminium to achieve maximum durability and economic efficiencies. Hot dip galvanizing is proven to perform very well in such environments.

The main piping that delivers the heated air to the aeration tanks is hot dip galvanized due to its resistance to corrosion and ability to withstand the heat and friction required for the process.

Structural steel and much of the other steel furniture is also hot dip galvanized. Most of this steelwork has been installed for around ten years and it is performing above expectations and some has been in use for over 15 years.

The plant's corrosivity levels are further increased by the fact that it is located on Victoria's surf coast. The combination of a sewage treatment plant in a coastal environment is testament to galvanizing's durability.

Conclusion

Water treatment and reclamation plants are an increasing part of the solution towards securing Australia's future. Sustainability and economics demand that only the most environmentally friendly and durable materials should be considered for such projects.

The Black Rock Water Reclamation Plant has been engineered to ensure that it has minimal impact on the surrounding environment and this means ruling out the use of materials that are not only costly to use, but can cause further problems when they degrade.

Hot dip galvanized steel is part of an environmentally sustainable facility that has had a relatively trouble-free life while minimising the financial burden on the community and future generations.

The Association wishes to thank Galvanizers Association Australia, for this article.

Some interesting applications from the American Galvanizers "Galvanizing Awards 2007"

Advanced Truckstop Electrification Terminal (ATE)

Fort Worth, TX
Aztec Galvanizing Services

Truck drivers are required by law to take mandatory breaks. Traditionally, drivers allowed their trucks to idle to supply air conditioning or power to sleeper appliances. Idling trucks are not only expensive and noisy, but also pollute the environment. Advanced Truckstop Electrification Terminals (ATE) allow the driver to turn off the engine and hook up to AC, telephone, electric, and internet. Additionally, the terminals provide a comfortable sleeping environment, and improve fuel efficiency.

Using hot-dip galvanized steel on the ATE stations not only meshes with the industrial environment of the truckstops, but also is able to withstand the constant exposure to truck exhaust and weather conditions. Currently, there are 225 ATE systems built, and another 210 are planned for 2007. Drivers line up to claim a fuel-saving, pollution-reducing space at the terminals so they can rest easy during their breaks. Hot dip galvanized steel has proven to be a cost effective, maintenance-free integral part of the ATE stations, and will continue to provide truck drivers peaceful rest all over the country for generations.

Galvanizer
Aztec Galvanizing Services

Specifier
Eaton Corp.

Additional
IdleAire Technologies

Johnson & Johnson Solar Roof Panel System

New Brunswick, NJ
American Galvanizing Co., Inc.

Johnson & Johnson desired a coating that would withstand the harsh New Brunswick winters with little future maintenance of the solar panel system erected on the roof of a multi-level parking garage. Powerlight Corp. has installed many solar panel systems, and thoroughly recognizes the benefits of galvanized steel because of the unmatchable track record in previous projects. With Johnson & Johnson's desire for longevity and low maintenance, and Powerlight Corp.'s past experience with the product, hot dip galvanized steel was the logical choice.

The hot dip galvanized structural framing, tube steel supports, and brackets will be able to withstand the harsh elements of the climate as well as the rigors of vehicle emissions. The roof structure is highly visible from street level and blends nicely with the concrete substructure and surrounding environment. With the alternative power market expanding steadily, this project will help propel hot-dip galvanizing as an important component in this growing market. The virtually maintenance-free coating of hot dip galvanizing will quietly but consistently protect the solar roof panel system so it can be

Advanced Truckstop Electrification Terminal (ATE).

Johnson & Johnson Solar Roof Panel System.

enjoyed today and Powerlight Corp. tomorrow alike.

Galvanizer
American Galvanizing Co., Inc.
Folsom, NJ

Specifier
Powerlight Corp.

Engineer
Ray Angelini Inc.

Fabricator
Empire Services

Nevada Solar One Solargenix Energy.

Nevada Solar One Solargenix Energy

Boulder City, NV
Aztec Galvanizing Services

The Nevada Solar One – Solargenix Energy project is the third largest solar energy center in the world, and the largest capacity facility built in 15 years. The massive project covers 400 acres with reflective mirrors, which are computer-controlled to rotate to the most effective angle to the sun. The desert location of the project means the hot-dip galvanized steel will be exposed to intense UV rays.

Solargenix's past experience with hot dip galvanized steel convinced them maintenance-free galvanized steel was the most cost effective option for the facility. The 180 000 mirror panels will be capable of producing 64 MW of

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Tuffboom.

power. This renewable energy source has the potential to compete directly with conventional fossil fuel powered technologies, and is becoming a wellknown alternative fuel source. This project is a first in the US of this size and magnitude, but larger projects are planned in Nevada and California. After the success of employing hot dip galvanized steel in this project, it is expected that the additional plants will use galvanized steel as well. The durability and longevity provided by galvanized steel will ensure hot dip galvanized steel will be a player in the expanding alternative energy market well into the future.

Galvanizer
Aztec Galvanizing Services

Specifier, Engineer
Lauren Engineers

Architect, Engineer
Solargenix

Tuffboom

Worldwide
Young Galvanizing, Inc.

For a long time, Worthington Products has relied on the strength of the galvanized coating to provide longevity to the steel products they fabricate. One new product, the Tuffboom, is a floating barrier used worldwide to cordon off waterways. They are commonly used to protect dams from debris and to keep boaters safe and out of spillways and hydro-electric water intakes. However, in addition to protecting the casual boater, they are also used to keep terrorists away from potential targets.

Since the attack on the USS Cole, thousands of feet of these barriers have been installed at US naval bases worldwide. The systems require a tough coating as they are in corrosive marine environments and are designed to stop a 15 000 pound speedboat going 50 knots. With the proven track record Worthington Products has had with galvanized steel, the choice was simple. Hot dip galvanized steel's superior corrosion protection in marine environments will help keep US Naval personnel, and leisure boaters safe well into the future.

Galvanizer
Young Galvanizing, Inc.
Pulaski, PA

Specifier
Worthington Products

The Association wishes to thank American Galvanizers Association, for these contributions.

Workshop – Regulations in Europe

Do you, or your customers, export zinc coated products to Europe?

Do you understand the new regulations?

The International Zinc Association has been involved in dialogue with European Regulators concerning the impact of the new REACH system. Working with the International Council on Mining and Metals and others, a body of expertise has been built up. The Registration, Evaluation and Authorisation of Chemicals could impact upon you if your product uses or contains chemicals (including zinc) and you, or your customer, exports to Europe.

IZASA has secured a local expert on REACH to brief you on the background to REACH and how it may impact upon your business. The Workshop will be held at the CSIR – Pretoria on Thursday, August 16th in the afternoon. Specific requests can be dealt with using the international resource where necessary. The cost of the workshop (which includes lunch) has been set at cost to ensure that the industry is fully informed on what is happening in Europe.

For further details contact IZASA *at izasa@icon.co.za*

Babcock Ntuthuko Powerlines

babcock

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HOT DIP GALVANIZERS ASSOCIATION
SOUTHERN AFRICA

Some global perspectives on hot dip galvanizing

Introduction

It is important to realise that the protection of steel against corrosion provides the largest single market for zinc (*figure* 1). Batch hot dip, or commonly called general, galvanizing consumption comprises a large sector of this market and generally enjoys a wide geographical spread due to the nature of the business whereby capacity can easily be matched with real and incipient demand at the local level. The market size for general galvanizing varies from region to region. Europe represents the largest consuming area although China is exhibiting the strongest growth.

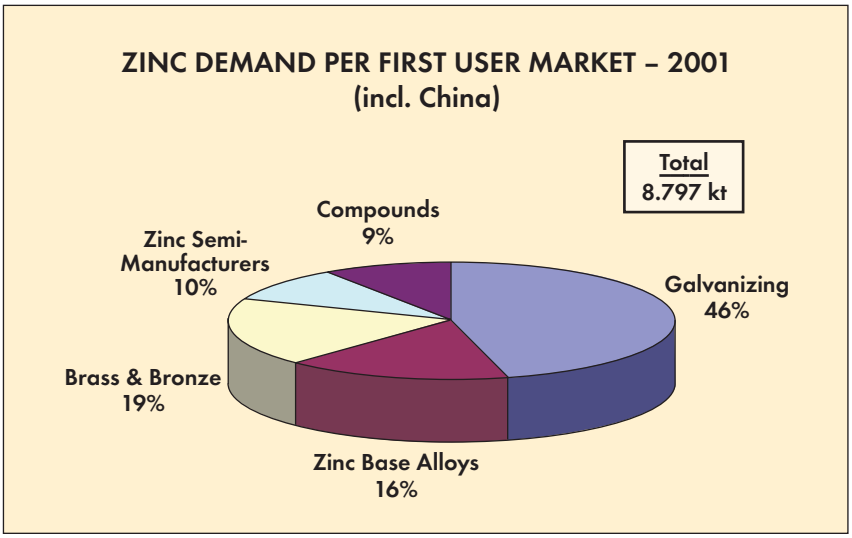

Figure 1: Zinc consumption per use.

Numerous consumption surveys have been carried out over the years. *Table* 1 provides market data using various sources and a couple of interesting facts emerge from this simple analysis. Firstly, overall zinc consumption per tonne appears lower in the more developed than developing world. Although this could be ascribed to variances in the types of steel product galvanized, overall markets remain sufficiently similar to indicate that other factors (such as operational efficiencies, alloy use, etc.) may be at play. Capacity utilisation figures indicate that the cry of the galvanizers for more market share to fill plants may be close to the mark. *Tables* 2 and 3 provide market data and, although comparisons are difficult due to differing definitions of market sectors the more onerous applications requiring aesthetic coating properties are those showing the highest growth in Europe, North America and Japan.

Industry performance

Over the years many industry reviews have been given. However, to provide relevance today, it is important to outline some current thinking. Technology is improving. As a result coating weights may be decreasing for a given performance. Traditionally, the industry has sold performance upon the coating weight alone. Perhaps there is a need to align the service criteria with the selling proposition of corrosion performance. Organic coating marketers sell product based upon performance rather than coating thickness (albeit that this also has relevance). The galvanizing industry is a service industry. However, it focuses on price when competing within the market. As a result the message to the user is confusing. This is exemplified by various surveys that have been carried out where the galvanizing industry believes that price is the primary concern, whereas in fact this is not the case. The user wants guarantee of performance and warranties are common in the painting industry. The galvanizing industry will have to address this issue. Similarly, to move out of traditional markets such as infrastructure where market growth is locked into GDP growth (or worse – Non-Residential Investment as in South Africa), appearance of the coating becomes an issue. Again, this is where the newer technology may provide new opportunities. However, these opportunities require a change in the mind set of the industry. So who will be able to take advantage of these opportunities? This is perhaps best answered by looking at the evolution of the industry.

Traditionally galvanizers were small family owned operations servicing a local need. Kettles tend to be small and therefore the opportunities limited. As the industry evolves, kettle sizes increase. However, the industry remains firmly in the SME sector hamstrung by all the limitations of small businesses. In Europe and the US, consolidation of the industry through mergers and acquisitions has developed an industry able to specialise. Therefore, the requirements of specific industries such as the auto industry can be met through

Region	Steel tonnes	Zinc tonnes	Av zinc consumption	No plants	Capacity utilisation
Europe (2003)	5 999 807	395 319	66 kg/tonne	658	58%
North America (2003)	2 721 000	166 000	61 kg/tonne	206	
India (2002)	600 000	34 000	56 kg/tonne	>130	Unknown
Australia (2001)	320 000	25 500	80 kg/tonne	>47 kettles	50%
Japan (2003)	1 536 089	91 601	60 kg/tonne	>120	Unknown
SE Asia (1998)	1 360 000	74 800	55 kg/tonne	76	50%
Africa (2002)	750 000	34 000	70 kg/tonne	60	50%
China (2003)	3 500 000	300 000	86 kg/tonne	1200 - 1500	50%
Latin America (2003)	1 705 000	124 750	73 kg/tonne	250	50%
Middle East	1 000 000			>100	Unknown

Table 1: General data for general galvanizing.

dedicated facilities not normally possible through the SME operation. These facilities are able to employ the newer technologies. Often in the developing world, the galvanizing facility is an adjunct to another operation such as transmission tower production or pole production or general fabrication (as widely found in China). So the challenge faced by the whole industry is how to move up the value added chain and away from the commodity perception often held by the customer base. We are often told that in many countries there is an excess of installed capacity. In specific instances this may be right. However, capacity utilisation is more likely a result of a lack of ability in creating a customer awareness of the service nature of galvanizing. Or is it due to a lack of understanding of this by certain industry players?

IZA support of the general galvanizing industry

The general galvanizing industry has come a long way since the registration of the galvanizing patent by Sorel in 1837. However, the basics of protection remain the same. Through the properties of

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barrier protection and cathodic protection, coating steel with zinc remains one of the most cost-effective methods of corrosion protection of steel. However, if that is so, why does the industry not enjoy a 100% market penetration?

Development, culture, and geography all impact upon a society's choices in terms of goods consumption. Without demand there is no need, without presence there is no use and without appreciation there is no consumption. Thus, not surprisingly, countries vary in degree of industrial/consumer development. In many instances cultures prevail which limit direct transfer of applications of product from one region to another. As a result centres of production become too dispersed to provide sensible market penetration. Hot dip galvanizing suffers the same vagaries of the market-place. However, a global network permits a reduction in these barriers to acceptance through shared experience and expertise. This facilitation role is a primary activity of the IZA. Within the general galvanizing industry, many country associations have joined the IZA as Associates to be able to participate in this sharing process.

The IZA and now also ILZRO, through a consultative process, attempts to establish a synergy of effort. Similarities between regions and countries do exist. However, the challenge is to effect market penetration transfer effectively.

As mentioned previously, markets are in different stages of development and this is true for general galvanizing. *Figure* 2 shows the consumption patterns in various countries for a suite of metals and the industry requirements depending upon market penetration. In developed markets different paradigms prevail to those in

Region	Main markets	Growth market (s)
Europe	Construction, street furniture, power transmission, agriculture	Street Furniture
North America	Electricity/telecoms, bridges & highways, building structures, original equipment manufacture.	Industrial Equipment Manufacture
India	Electricity/telecoms, highways, street furniture	Infrastructure construction & poles
Australia	Mining, general construction	Resources and Mining
Japan	Buildings, electricity/telecoms, bridges, parking structures	Buildings
SE Asia	Electricity/telecoms, highways, building structures	Infrastructure construction
Africa	Mining, general construction	Resources and Mining
China	Electricity/telecoms, highways, street furniture	Electricity/telecoms/highways
Latin America	Electricity/telecoms, highways, street furniture, petrochemical	Electricity/telecoms

Table 2: Global market data for general galvanizing.

Region/ country	Market Sector														
	Electrical	Telecoms	Bridge/ Highway	Street furniture	Agriculture	Industrial Equipment (OEM)	Transport	Building structures	Fasteners	Auto	Petro-chem	Receation	Water/ waste water	Ship	Other
EU (2003)	8.8%			18.3%	9.2%	7.4%	6.5%	40.7%	3.5%	0%					5.6%
North Am (2002)	21%		19%		6%	14%	4%	13%		0%	7%	7%	2%		6%
South Africa (2002)	15%		2%	3%	5%	2%	1%	69%						3%	
Colombia (2003)	20%	15%				10%		40%			10%				5%
Venezuela (2003)	15%	10%						10%			60%				5%
Japan (2003)	9.2%		15.9%				1%	44.3%[2]	2.6%					3.7%	23.6%[3]
India (2002)	46.4%	12%				11%	2.4%								28.3%[4]
China[5] (2002)	44%	11%					18%							26%[6]	

Notes:

1. Includes all mining applications
2. Includes construction 32.3%, grating 6.2%, scaffolding 3.2%, joints 2.6%
3. Includes pipes 9.5%, general steel 3.2%, other 10.9%
4. Includes accessories 24.9%, miscellaneous 3.4%
5. Excludes wire
6. Tube products

Table 3: Market data for certain countries/regions.

Issue	Developed market	Developing market	Comment
Cost	There is always a need for convincing data.	Ditto	Whilst often contentious and regional, comparison costs are always persuasive.
Fabricator	Viewed as an important chain in acceptance.	Ditto	The fact that surveys have been carried out indicates that this area is key to market development.
Steel Use	Cultural. See the challenge as increasing the percentage of steel galvanized.	Cultural but also depends upon availability. The challenge is to increase the use of steel.	Where alternative materials are used, the drives of the steel industry should be supported.
Coating Performance	Data is available but dispersed.	Specifier often persuaded by direct comparisons.	The plethora of information is often indigestible by the market. Clarity and simplicity is required.
Markets	Sophisticated, user more interested in "soft" issues.	Cost, performance and availability are key issues.	Where possible, the experience in the developed markets must be leveraged.
Market Development	Large Associations have capacity.	New Associations rely upon information from others.	A common industry portal is required.
Communication	Most methods of communication can be used. There are numerous sources of data.	Direct personal contact required. Access to international data difficult.	Although subjective, it appears as if the internet and seminars address the extremes.
Standards	Consensus agreed upon standards. Aesthetics still an issue.	Performance is often company dependant restricting overall growth.	The harmonisation of standards will address part of the issue.
Performance	Service issues paramount	Delivery (and price) is the key to success	Partnering as a business principle should be encouraged.

Table 4: Some key issues as they relate to the General Galvanizing industry in developed and developing regions.

developing countries. *Table* 4 shows the difference concerning issues between developed and developing regions from discussions with various parties. In developing regions, the challenge is to build a competent industry that can take full advantage of markets currently enjoyed in other areas. The developed country markets require the application of new technologies to new markets whilst encouraging end use partnering and retention of existing applications through careful monitoring of societies needs. Much activity in Europe has focused upon Risk Assessment, matching any regulatory threats with applicable science. This activity should provide true perspective of the real environmental threats. A recently held local Workshop was hosted by IZASA with IZA support to communicate the work carried out in Europe and its likely impact locally.

In the final analysis, transfer of projects across regional boundaries requires some assessment of the probability of success. Industry structures should ideally be similar where such cross country activities are planned and this in itself provides a challenge. Often per capita zinc consumption figures are given as the baseline to indicate where new growth is likely. However, whether purchasing parity or Gini coefficients are used to describe a countries wealth it is difficult to gain insight as to the ability of a market to absorb new developments.

In its commitment to market development and product research, the IZA and ILZRO have carried out various industry consultations and continue to do so. Galvanizing Associations as IZA Associate Members are encouraged to provide input into the philosophy of the programmes funded by the IZA. IZASA as the local representative of the IZA will continue to work closely with the Hot Dip Galvanizers Association. The Association wishes to thank IZASA for this article.

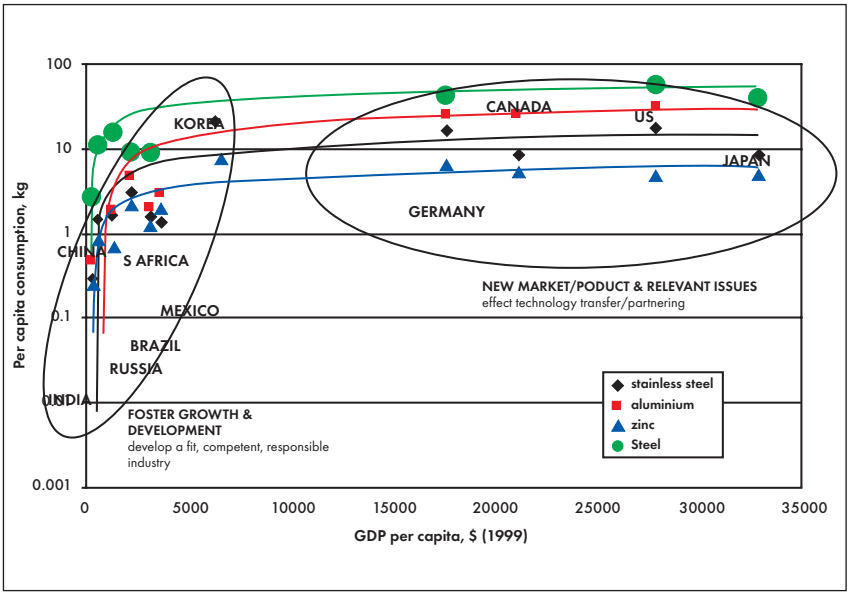

Figure 2. Metal consumption data for various countries.

Guest Writer

Bob Andrew, our guest writer, is a consulting value engineer and Honourary Life Member of this Association.

Like the slime mould, mergers, acquisitions and unbundling should be seen as part of a company's life cycle

We hear an awful lot today about 'mergers', 'acquisitions' and 'unbundling'. These seem to have become the common tools that companies use to reshape themselves in their search for greater efficiency.

Some companies resort to unbundling to unlock value for their shareholders. Others merge with, or acquire, related businesses to rationalise their cost base and expand market share. Sometimes companies unbundle before merging and sometimes they merge before they unbundle.

Virtually every popular management book these days is filled with talk of flattening organisation charts, downsizing or outsourcing functional departments to speed up customer response times and product cycles. Breaking up creaky old corporate empires and replacing them with something more flexible and dynamic has become the new business paradigm. The competitive advantage that can be gained by forming co-operative and co-evolving relationships with similar organisations is also becoming increasingly apparent.

What has been missing though is a satisfying explanation of why so many companies seem so unprepared for these new dynamics. Why must acquisitions and unbundling be so sudden and so traumatic, especially to affected employees? Is it because corporate strategic plans have never included the possibility of hostile or friendly take-overs? Have companies been led to believe that growth in unpredictable and changing environments is forever sustainable?

Why is it also that so many acquisitions and mergers fail? Why do so many companies embark upon re-bundling, sometimes very soon after they have unbundled?

A spectacular example of a strategically planned merger and unbundling is that carried out by an organism called 'slime mould' (Myxomycetes).

Slime mould is an extraordinary creature. For one part of its life it is an animal and for the other a plant.

As an animal, it starts out as a multitude of single flagellated cells, commonly found in forests under decaying logs and damp leaves, feeding on bacteria and decaying vegetation. Often they eat so much and grow so rapidly that they deplete the entire food supply in their environment. When this happens the individual cells swarm together and fuse into a single cohesive mass which resembles a slug. In this form it is able to slither across the forest floor to seek new pastures.

When it has found a new source of food, the mould enters its plant-like phase, developing a stalk with a fruiting body and looking very much like a fungus. Finally the fruit capsule bursts, spewing out thousands of dry spores from which new individual cells are born. The new cells then move about independently in search for food; a new life cycle is started.

The slime mould knows that its environment is complex and uncertain and yet has developed a successful survival plan that has been used for thousands of years in all sorts of conditions. The key elements of the plan are cyclical periods of growth and consolidation, and an adaptive interchange between individual competition and community co-operation. It uses competition for individual growth and co-operation for group survival. In this way, the slime mould can direct the entire group towards more favourable environments to improve the chances for survival.

Many organisations are xenophobic and view a merger or an acquisition as an intrusion of foreign bodies, ideas and values. They will usually firmly resist any changes to short term objectives that are needed to accommodate the foreigners.

Slime moulds view mergers as essential for survival and are quite prepared to change short term objectives where these are required. They are even prepared to drastically alter their form and shape in the interest of the group. Unlike many merged or acquired companies, however, their core business vision never changes.

In the life cycle of the slime mould, no individual stakeholders get hurt in the process. They may lose individual freedom for a while during the period of consolidating the masses but are liberated when the crisis is over. Indeed, surviving the crisis as a group allows them to be unbundled and reborn as individuals in fresh and challenging environments.

Mergers, acquisitions and unbundling will remain as corporate efficiency promoters for as long as the business environment remains uncertain and unpredictable. organisations should, however, heed the behaviour of the lowly slime mould and include these as inevitable processes in their strategic life cycle plans.

Preparing hot dip galvanized steel for painting – a duplex system

Hot dip galvanizing by itself is a long-lasting and cost effective means of protecting steel from corrosion. When organic coatings such as paint or powder coatings are applied over hot dip galvanized steel, the resulting combination is referred to as a duplex coating. These coatings are used to:

- Add colour for aesthetic, camouflage, or safety purposes;
- Increase the economic life of a structure; or
- Provide additional protection in aggressive environments.

Paint coatings may be applied soon after hot dip galvanizing, or later in the life-time of the structure when the galvanized coating has weathered.

As with all protective treatments of steel, thorough preparation of the galvanized surface is very important. In particular, failure to degrease the galvanized surface properly is the most common cause of problems for duplex coatings.

The reasons for the need for effective surface preparation in most cases are quite straightforward. When the steel is withdrawn form the galvanizing bath, it has a clean, bright shiny surface. With time, this changes to a dull grey patina as the surface zinc reacts with oxygen, water, and carbon dioxide in the atmosphere to form a complex but tough, stable, protective layer that adheres tightly to the zinc.

How long the patina takes to develop will depend on the surrounding climate. Typically, the time can vary from six months to two years or more. During this transition period, simple oxides and carbonates form that do not adhere strongly to the surface. As most coatings are applied whilst the galvanizing is in this condition, the surface layer must be modified by chemical or mechanical means.

Where aesthetic requirements for a coating system are particularly high a degree of surface finishing or fettling may be required on galvanized coatings, since small surface projections may become more obvious

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after the application of an organic coating. This is particularly the case for powder coating systems. Care must be taken when smoothing a galvanized coating because the zinc may be damaged by heavy or excessive grinding.

Guidelines: pre-treatment for painting

Guidelines for the pre-treatment of galvanized surfaces have been drawn up as a result of many years of experience with duplex coatings.

Although pre-treatment of galvanized components is best carried out immediately after galvanizing, before the surface has become contaminated in any way, this is not always practical.

Pre-treatment can be carried out later, but it is vital that the surface is adequately cleaned to remove all traces of contaminants such as oil, grease, dirt and atmospheric residues. The cleaning operation must leave no residues on the cleaned surface, and any wet storage staining should be removed using a stiff brush. Washing down the coating with water will help to remove soluble salts.

There are a few recognised methods of galvanized surface pre-treatment that produce a sound substrate for coating: i.e. etch priming, sweep blasting, and weathering followed by treatment.

Etch primers

Etch primers have also been used successfully. Their major disadvantage is the absence of any visible colour change to the surface. This makes it difficult to have complete confidence that all surfaces have reacted with the primer. Etch primers are most suited to application on older, weathered galvanizing.

Sweep blasting

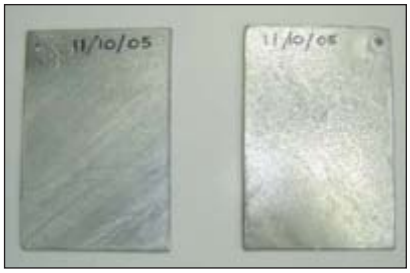
A mechanical method of pre-treatment is sweep blasting using fine copper slag or garnet with a blast pressure of no more than 40 psi (2.7 bar). This will ensure that only the minimum amount of zinc oxide is removed and that the zinc surface is left in a slightly roughened condition (profile <20µm – *see sketch below*). In order to test whether sweep blasting has been successful, one can measure the coating thickness before and after sweep blasting (*see photos below*). Should the coating have grown in thickness after sweep blasting it is considered to be successful. The reason why the coating grows in thickness after successful sweep blasting is that the soft zinc or eta layer fluffs up under the blast pressure to produce a profile. When one measures the profile, the probe will only pick up the peaks of the profile, indicating growth in the coating.

Care should be taken when sweep blasting very thick galvanized coatings to avoid damage to them. For optimum results, the nozzle-to-work-piece distance and angle of blasting need to be identified for all surfaces on the galvanized steelwork. Angular iron blasting grit must not be used under any circumstances. Sweep blasting is often used in addition to chemical preparation.

Weathering

This process only becomes fully effective after a galvanized surface has been exposed to the atmosphere for at least six months. The surface is prepared using either abrasive pads or a stiff brush to remove loosely adherent materials without restoring the bright zinc finish. This is followed by a hot detergent wash and a clean water rinse. The surface must be fully dry before any paint is applied.

Weathering should not be used for surface preparation in marine environments with high chloride levels.



Coating thickness readings before sweep blasting:
Left: Mean 111 Min 94 Max 141 No. of readings 15
Right: Mean 85 Min 73 Max 98 No. of readings 16

Coating thickness readings after sweep blasting:
Left: Mean 121 Min 99 Max 148 No. of readings 15
Right: Mean 100 Min 84 Max 125 No. of readings 16

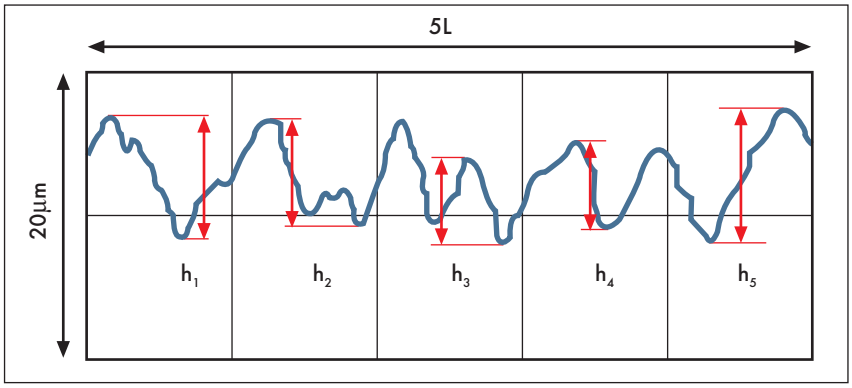


Figure 5: Surface profile of a swept galvanized steel surface over a length 5L. Top to bottom: R_z

$$R_z = \frac{H_1 + h_2 + h_3 + h_4 + h_5}{5}$$

Reduction of zinc coating thickness 8 - 13µ

Guidelines: painting

All paint systems used should be specifically formulated for galvanized steel and applied in accordance with the manufacturer's recommendations.

The choice of paint systems will depend on the specific application. Epoxy systems have given good results, and both high and low micaceous iron oxide paints can be used to provide a wide range of colours. The presence of micaceous iron oxide has been shown to

improve adhesion performance of epoxy systems.

The duplex coating system used by most major projects is a two-component polyamide epoxy intermediate and a two-component aliphatic polyurethane topcoat. The hot dip galvanizing is considered the primer.

Observations

I have observed the following points in regard to painting over hot dip galvanizing:

- Many applicators applying Duplex systems lack knowledge and training regarding the quality and technical aspects of duplex coating systems. This lack of information has resulted in many duplex coating system failures and facility owners general fear of accepting jobs that specify duplex coating systems.
- Because previously galvanized items will not rust after sweep blasting, some facility owners and contractors believe that they can prepare the galvanized items, set them aside for a period of time (sometimes a couple of days), and then apply the coating materials as usual with no further preparation or cleaning. This delay in coating the galvanized items can be problematic. When the loosely adhering zinc oxide/hydroxide layers are removed from the coated items by abrasive sweep blasting, the galvanized surface quickly begins to "heal" itself for once again forming a layer of zinc oxide. The layer can interfere with coating adhesion. This healing condition is the primary reason why the reference specification ASTM D6386 recommends coating of freshly sweep blasted galvanized surface within 24 hours or as quickly as practical.
- Further clarification of the "Finish" and "Appearance" of the currently accepted galvanizing specification is necessary with regard to galvanizing quality when a duplex coating system is specified.

Previously, for galvanizing on its own, lumps, projections, globules, or heavy deposits of zinc may be acceptable, but in a number of casers, these imperfections actually caused the final appearance of the coated product to be considered unacceptable. Such imperfections should be removed before an item is accepted for final blasting and coating. It is important that the galvanizer be notified when a product is to be coated so that the proper production and quality controls may be implemented. Minor repairs of damaged galvanizing can be touched up with organic zinc rich primers prior to additional coatings.

Application

Contractors should use the following procedures for painting over hot dip galvanizing:

- Notify the galvanizer that items are going to be duplex coated.
- Do not quench items or apply post-galvanizing oils.
- Prepare the surfaces of galvanized items in accordance with the following steps:
  - Abrasive sweep blast all newly galvanized surfaces.
  - Apply subsequent coating in accordance with the manufacturer's recommendations (e.g., product data sheets) for the material/system specified within the time frame specified or as soon as practical. This should eliminate the reformation of zinc oxides on the galvanized surface prior to the application of subsequent coatings.

The Association wishes to thank Mike Book of Duplex Coatings cc for this contribution.

Understanding one of the criteria for measuring the hot dip galvanized coating thickness in terms of SANS 121 (ISO 1461)

As part of the Association's effort to educate and improve the frequent ineffective communication between the end client and the galvanizer, often via a number of contracting parties, the specifiers finish expectations and the manufacturer and galvanizer's commitment to the quality of the final product, etc. we include for your reading, this coating report by the Association.

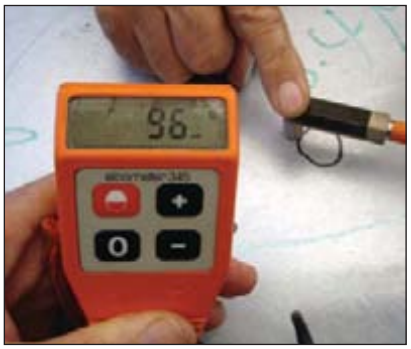
For obvious reasons names of all parties have been withheld but the article might prove invaluable to others in order to avoid similar situations in future.

Report

The Hot Dip Galvanizers Association was asked to comment on the hot dip galvanized coating on a 10m long tubular mast for use in the communication industry. I report as follows:

Unless specifically requested for other reasons, hot dip galvanizing is normally specified primarily for corrosion protection. For this reason, the two most important inspection criteria of hot dip galvanizing are coating thickness and coating continuity.

A general view of the mast taken from the base end.



The eight coating thickness readings including the low reading of 77µm in the photos average 91.25µm, which is acceptable in terms of the specification. A minimum of 5 readings per reference area is required by the specification.

Coating thickness

A number of coating thickness readings were taken indicating an upper coating thickness of 457µm (on a high spot) and a minimum of 77µm. *See table of coating thickness readings on page* 30. Although far in excess of the minimum coating thickness required by the SANS 121 (ISO 1461) specification, the coating thickness is acceptable.

The SANS 121 specification requires that for steel thickness equal to and greater than 6mm the local coating thickness is a minimum of 70µm with a mean of at least 85µm.

An individual coating thickness reading on one of the panels measuring about 77µm was seen to be a source of concern. The coating thickness reading is shown in the photos below together with the surrounding coating thicknesses.

continued on page 30...

Photos above and below left show the coating thickness readings on the reactive steel and the photos on the right the coating thickness readings on the non-reactive steel adjacent to the reactive steel.

Reference areas in SANS 121 states that in determining acceptable coating thickness, if any one of a minimum of 5 coating thickness readings is less than that required in table 2 (*see below*) it is irrelevant, as only the mean value over the whole of each reference area is required to be equal to or greater than the local coating thickness given in the table.

As can be seen the centre photo coating thickness reading is 77µm but the mean coating thickness of the surrounding area (about the size of a reference area – 100cm^2) including the centre reading is 91.25µm (*see page* 28). The coating thickness thus conforms to the requirements of SANS 121.

Coating continuity

Apart from one or two minor areas where the coating has been damaged during handling at the galvanizer, which have been repaired by zinc metal spraying in accordance with the requirements of the specification, the coating is continuous and acceptable in accordance with SANS 121.

The holes in the base plate have been apparently flame cut. Temperatures associated with flame cutting alter the surface properties of the steel and normally if such surfaces are not thoroughly ground, a thinner hot dip galvanized coating will be formed. Photos above show that in spite of the flame cutting, the coating thickness is not affected on the inside of the holes.

Without the addition of suitable handling lugs positioned to assist the lifting of the mast by all parties, coating damage is likely to happen.

Reactive to non-reactive steel panels

A hot dip galvanized coating forms as a result of molten zinc metallurgically reacting with suitably cleaned steel. Coating thickness and appearance is mainly as a result of the chemical composition of the steel, with silicon and phosphorus playing the major roles. For applications such as this, the correct chemical composition of the steel can be ordered to suit the hot dip galvanized coating thickness requirements.

Should this not be done, reactive steel such as the panels in the photos are likely to be incorporated in the mast which can result in excessively thick coatings adjacent to thinner coatings, the former of which are more likely to incur mechanical damage through frequent handling.

Conclusion

The mast is acceptable in terms of SANS 121.

For additional corrosion protection the customer requested that the coating have a minimum coating thickness of 90µm, which is greater than that required by SANS 121. The mast still conforms to this requirement when measured in terms of SANS 121 (ISO 1461) – Reference Areas.

Terry Smith

COATING THICKNESS READINGS (µm)				
	Mean	Max	Min	No. of readings
Reactive steel	173	224	104	34
Non-reactive steel	113	175	77	58
Zinc metal sprayed areas	173	245	106	20
Overall coating thickness	229	457#	102	59
# Reading was taken on a high spot.				

Table 1: Coating thickness readings.

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 2: Minimum coating thickness on articles that are not centrifuged – SANS 121 (ISO 1461).

APOLOGY: Hot Dip Galvanizing Today wishes to apologise for omitting our newly accepted general galvanizing member Harrismith Galvanizing and Steel Profile, from the previous magazine's matrix of members. Kindly refer to the latest matrix for their details.

MORE DURABLE CONCRETE STRUCTURES USING HOT DIP GALVANIZED REINFORCING STEEL

Common Fund for Commodities: Technology Transfer Workshop

WORKSHOP ORGANISED FOR 8th JUNE 2007 BY THE HOT DIP GALVANIZERS ASSOCIATION SOUTHERN AFRICA AND SPONSORED BY THE COMMON FUND FOR COMMODITIES, THE INTERNATIONAL LEAD ZINC STUDY GROUP AND THE INTERNATIONAL ZINC ASSOCIATION SOUTHERN AFRICA

The Breakwater Lodge, Lecture Theatre 2, University of Cape Town, Portswood Road, V&A Waterfront, Cape Town

PRESENTERS: Terry Smith (HDGASA), Rob White (IZASA), Keith Mackie (Keith Mackie Consulting) & Rodney Bishop (Cape Town City Council)

WORKSHOP OBJECTIVES:

The objective of this morning workshop is to educate participants about the problems of corrosion in reinforced concrete and how they can be solved by using hot dip galvanized reinforcing.

Durable concrete requires control of the four C's; Concrete cover, Compaction, Cement water ratio and Curing. However good site management is required to ensure durable concrete is achieved. Often in practice this is not always possible, and in time spalling of the concrete occurs as a result of corrosion of the reinforcing steel. Spalling can compromise the integrity and shorten the service life of a structure. Lowering the potential for corrosion of the concrete reinforcement, by hot dip galvanizing, will prevent spalling.

HOT DIP GALVANIZERS ASSOCIATION SOUTHERN AFRICA

FOR MORE INFORMATION CONTACT SASKIA AT THE HDGASA ON (011) 456-7960 OR hdgasa@icon.co.za

Personality Profile

Decoding Louis H. van Loon

Louis H. van Loon was born in Amsterdam in 1935. Germany's invasion of Poland in 1939 signalled the start of the Second World War. The events that followed had a profound influence on the young van Loon:"As a very young child, I realised how cruel one man can be to another." The family van Loon lived in the Jewish quarter of Amsterdam and as the war progressed, it became apparent what the fate was of their Jewish friends that were being carted away by the Germans. Louis' father became increasingly involved in the resistance movement and he recounts stories of his father assisting in the hiding of Jewish friends in attics, under floorboards and behind false walls. Fully fledged war resulted in no schooling for the children of Amsterdam. At a very early age, Louis took responsibility for his own education. With money earned playing the accordion, Louis decided to buy secondhand books from the market:" I did not really know what I wanted to read and quite frankly I didn't care. The first book I bought aged 12 was 'A Freudian Psychological Analysis of Dostoyevsky's Literature'." More literature followed on topics such as Astronomy, Architecture, Philosophy & Geology all of which captivated its young reader, transporting his mind beyond the mayhem that was his milieu.

With the war over, the virtually self-educated teen faced the decision of a career. His expansive reading left him with many interests and he was uncertain of which route to follow. Accompanying a friend to register

at the Amsterdam Technical College, Louis was faced with the list of courses the institution offered. On the spur of the moment he decided on Civil Engineering. The course also covered Architecture, which was one of Louis' many interests. He explains the intense training the students were put through:" In addition to lectures from 8-5, we were expected in our overalls on Saturdays and taught techniques through practical exercise such as fixing steel reinforcing, welding, brick-laying and various other building skills. This experience came in handy during my professional career. I recall designing a building which required stone cladding. At the site inspection I wasn't happy with what I saw and came back later donning my blue overalls to do the work myself! It blew the contractors away."

The reality of post-war Amsterdam set in after Louis graduated. The Dutch Government realised that it could not employ all its graduates and in a desperate scheme offered graduates the opportunity to relocate to Canada, New Zealand, Australia or South Africa, on securing employment, providing passage only." We were shipped out like cattle, in a war-ship designed to transport troops." This strange twist of fate saw a 20 year old Louis, a newly qualified Engineer, land in Cape Town, with 20 Pounds Sterling in his pocket. He laughs:" The beauty of Cape Town took my breath away to the extent that I contemplated discarding my ambitions and becoming a 'Bergie artist'. I was due to start a position in Luipaardsvlei, near Krugersdorp, so one can understand my preference to remain in Cape Town." Duty called however and Louis started as a Geotechnical Engineer, a discipline of which he had limited knowledge. Language proved to be a barrier but his Dutch came in handy in the very Afrikaans environment. His work-related travels took him to various destinations in South Africa but a trip to Durban, he states: "was like coming home". He explains:" Growing up I had a well-to-do uncle, who frequently went on holiday abroad. He would send us exotic postcards always featuring palm trees, which he found wildly attractive. I had at last arrived where I wanted to be, standing on the Esplanade under a palm tree, savouring the play of its shadow on the pavement as it swayed gently with boats bobbing far off in the blue ocean. It was like the Mediterranean on those postcards all over again." In a bold move after analyzing soil for a development in Durban, Louis called his employer stating that he believed the company needed an office in Durban. He explains:" The soil in Durban was a witch's brew of

extremes from a Geotechnical Engineering point of view. Also, I really did not want to go back to Krugersdorp!" His employer relented and his office was a room in the Beach Hotel. With his English lacking severely, Louis prepared a sales pitch from a dictionary which he read to architects, his prospective clients, over the phone, working his way through the Yellow Pages. His company vehicle was a Vespa Scooter. Such were his efforts that within 6 months the company relocated to Durban! Moving on after a year, Louis settled into a career with Danish Consulting Engineer, Peter Jenssen, finally working in his chosen disciplines; Engineering & Architecture. When Jenssen decided to move to France after two years the practice Louis H van Loon & Associates was born. Commissions started pouring in and within 3 years the practice had boomed with offices in Cape Town, Sasolburg, Johannesburg, Kenya & Zimbabwe.

Louis has always been a deeply philosophical man (he has a honourary MA in Philosophy from UDW and lectured in Eastern Philosophy at UDW & UCT as a visiting lecturer for 22 years.) A visit to India in 1959 cemented his attraction to Buddhist Philosophy. He witnessed first-hand the Chinese persecution and subsequent exile of Tibetan monks and met the Dalai Lama shortly after his escape to India, where he remains in exile. "The sheer joie de vivre of these people who had lost everything was profound! Their joy and contentment at just being alive touched me and changed my life."

His morals and principles as a vegetarian and Buddhist were largely the reasons for a dramatic twist in the success story and subsequent scaling down of his practice in the late 1960's. He had been commissioned by a client to design and build an abattoir in Zimbabwe. He explains:" There is a Buddhist principle called 'right livelihood' which implies that you should aim to earn your money in a manner which is ethical, doing as little harm as possible. As a vegetarian and a Buddhist I just could not take on the commission. I realised that the bigger & more successful my practice became, the more I would be faced with such moral & ethical dilemmas. I decided to "deconstruct" my large practice by giving my staff more responsibility. Eventually they were able to carry on earning a living, doing what they did for me under their own steam. Surprisingly it was more difficult and took me longer to scale down my practice responsibly than building it up!" Louis started the Buddhist Retreat Centre in Ixopo in 1970, which he basically built himself, including a 5m sculpture of Buddha, believed to be the tallest in the non-Buddhist world. When asked about his ability as a sculptor he laughs:" I have never allowed my lack of experience in anything to become an obstacle in achieving something." Louis also founded the Vegetarian Union of South Africa.

Louis H van Loon & Associates continues to thrive, but Louis is selective about the projects he undertakes. He has a passion for projects that are of service to the individuals that utilises its spaces, such as hospitals and schools. "I am fortunate that my profession satisfies both sides of my brain. The left which is clarity and precision (engineer) and the right which is the imaginative artist (architect). My skills allow me interpret buildings in both function and form and I feel that function need not lack exquisite form. As a result even industrial commissions should serve their purpose structurally as well as being aesthetically pleasing." Steel features boldly when required and Louis feels that the beauty and inherent properties of steel are unsurpassed. "Perfection is an I-Beam". He is also a firm believer in displaying materials honestly. He prefers to leave concrete "off-shutter" and Hot Dip Galvanized steel unpainted. When prompted about role-models in architecture, Louis rattles off a list of infamous names. When prompted about what he admires about their work, he states that he dislikes all of it! He feels that many modern architects have become excessive and buildings have become overt egotistical statements. He has a great admiration for pure simple design where spaces, volumes and surfaces interact harmoniously and intriguingly, such as the 1999 Exhibition Wing addition to the Van Gogh Museum in Amsterdam, by Japanese architect Kisho Kurokawa. Louis believes in "honest to goodness design"; architecture and engineering should be as honest and direct as possible to serve the intended use. It is then also effortlessly beautiful like a tree, which simply responds to the conditions in which it finds itself.

Japanese brush painting (Sumi-e) and Pen&Ink sketching count amongst Louis' legion hobbies & interests. He celebrates life with his wife Chrisi, his soulmate, in their Durban home, which doubles as his studio. "There are no divisions between my private life and work. It allows me flexibility and we enjoy life at a healthy, balanced pace." At 71 Louis has no intention of retiring and feels that the variety in his activities keeps him grounded and connected to life.

The Association wishes to thank Desere Strydom for conducting and recording this interview.

Walter's Corner

How long does "galvanizing" last

I was once asked how long a hot dip galvanized coating lasts, to which I replied anything from about 3 years to 100 years. This is not the facetious answer that it may sound like.

To illustrate, just outside Rustenburg is the well known President Paul Kruger farm house, now a museum. The hot dip galvanized roof sheeting on this house was imported from England well over a century ago. On arrival, it was found that an insufficient quantity had been ordered, hence the President in his wisdom had the ox-wagon rolled over the sheets to flatten out the corrugation somewhat, thus ensuring that having been stretched, the quantity of sheets was sufficient. After more than 100 years, this hot dip galvanized coating continues to provide protection.

A spectacular performance, you may well say, but highly misleading if the facts pertaining to this case are not considered.

The galvanized roof sheeting would have been zinc coated to a thickness of 60 to 70 microns. This is because the so-called Zenzimir process had not yet been developed. This modern continuous galvanizing process yields a coating thickness of between 18 and 20 microns per side (Z275), i.e. less than a third of the thickness on the President Kruger farm house roof.

The flattening of the sheets prior to erection is unlikely to have significantly damaged the coating which would have consisted largely of ductile zinc over a relatively thin iron / zinc alloy layer. This is because the steels used for producing corrugated iron are not severely reactive with molten zinc.

The atmospheric corrosion rate in the Rustenburg district is naturally low, while industrial air pollution is not remotely severe at the site under consideration. I would estimate the atmospheric corrosion rate of zinc to be about 0.5µm per annum or in other words, a 60µm thick galvanized coating should yield a life of about 120 years, since the life of a galvanized coating is more or less proportional to its thickness in a given environment.

Having considered all these facts, it is fair to say that anything less than 100 years life in this instance would have been disappointing.

On the other hand, let us consider the durability of the Rustenburg sheeting in totally different situations. If a galvanized coating of this nature were to be applied to a structure erected about 50m from the sea spray zone, say on the Natal coast line, a maintenance free life of about 5 years would be regarded as reasonable if additional corrosion protection by means of a paint coating was not provided. Then again, were the same galvanized components to be totally immersed in sea water, a rust free life of up to 10 years could be expected. This is because the potassium chloride present to a greater or lesser degree in all sea water, acts as a corrosion inhibitor.

Some years ago, I was contacted by an engineer responsible for corrosion control at the Simonstown Naval Base. He required to know how to protect a steel component to be attached to the hull of a submarine. He pointed out furthermore that the component would be permanently immersed in sea water and that a corrosion free life of at least 3 years was essential. When I suggested to him that a hot dip galvanized coating preferably about 85µm in thickness would provide up to 10 years life, he seemed to be somewhat skeptical but agreed to apply a galvanized coating. Some three years later, the same engineer contacted me to tell me that the galvanized component which had been permanently immersed for about 3 years had now been brought to the surface and the coating was found to be in excellent condition. He went on to confess that his original skepticism had been provided to be unfounded.

In these examples, we have a variety of results which range from exceptionally durable to poor, all for the same coating. The lesson to learn from this is that selection of the most appropriate protective coating or for that matter corrosion resistant material should only be made once the degree as well as the cause of corrosion in the particular environment has been established. This should ensure that under protection or for that matter wasteful over protection are avoided.

To illustrate, because an unpainted hot dip galvanized coating will fail along the Namibian coast line is no reason for not using it in the Rustenburg district and wasting money on a more expensive coating system. Likewise, to use the hot dip galvanized coating as applied on the President Kruger farm roof in Walvis Bay without additional protection by way of a heavy duty paint coating, would be very foolish.

This is where hot dip galvanizing can yield good results even in environments where zinc is attacked fairly severely. By combining the attributes of a good paint system to those of zinc in the form of hot dip galvanizing, the synergistic effect so achieved can provide long term protection even in aggressive environments. To illustrate, if a paint system on its own would provide a protective life of about 6 years and a galvanized coating in the same environment about 10 years, the total life which can be expected will be about 24 years and not 16 years if the organic coating and the metallic zinc coating were to be used in combination as a duplex system.

Contrary to the opinion expressed by many so called experts, painting of hot dip galvanized surfaces is no more complicated than painting a steel surface provided that normal surface preparation is undertaken and a paint which is compatible with zinc is used. Failures of duplex systems can frequently be attributed t the application of an alkyd enamel paint directly onto zinc. This is because alkyds react chemically with zinc which results in poor adhesion and eventual paint flaking.

To summarise, it is necessary to select the most cost effective corrosion control system for specific applications. The two important factors to establish are firstly the degree of corrosion anticipated and secondly the minimum life span required. To provide a protective system which guarantees a life span of say 75 years maintenance free when only 10 years is required, is invariably a waste of money.

Finally, if in doubt, experienced technical personnel at the HDGASA can assist by providing independent recommendations and technical advice.

We wish to thank Walter for his contribution, may there be many more!

"Extreme milkshake drinking..."

All coatings are subject to the corrosive effects of normal atmospheric conditions and with hot dip galvanizing, because of its durability, life of the coating is reasonable predictable. However on 18 March 2007, the East Coast of South Africa was subjected to a side of Mother Nature we don't usually get to see. Gale force winds and enormous swells in excess of 7m wreaked havoc along the coastline, causing damage estimated in excess of a Billion Rand. Bad weather is one thing, but compounding the matter was the alignment of the earth, moon and sun which meant that the equinox spring tide was at its highest level in 18 years.

Bringing the story closer to home was the fate of the Lazy Shades, situated on the Blue Flag Margate Beachfront. This Duplex coated leisure seating facility was an entry by Phoenix Galvanizing in the Eskom HDGASA Awards 2004 in the category Prominent Projects. Cor Blackie, owner and developer of the business moved from Gauteng to retire when he saw the need for a semi-permanent leisure facility on the Margate Beach. The "Shades" were born on 7 March 2004 and have been a thriving "hobby" for its creator ever since.

On 18 and 19 March 2007 the Lazy Shades were virtually destroyed by the freak spring tide. Cor Blackie states:" We expected that it would be bad, but not this bad. I had a frantic call from my security guard at three in the morning; when I got there, I could not believe my eyes. I was literally knocked over by the waves on the verandah of a popular Fast Food restaurant situated behind my venture." To comprehend the magnitude of the force, one has to bear in mind that the Lazy Shades are situated approximately 60m from the high water mark. With the freak High Tide at its peak, only the very tips of the "Shades" (measuring 2.8m in height) were visible. The onslaught also dragged one of the units, weighing in excess of 350kg out to sea! Many more were damaged beyond repair and all of units were buried under two metres of sea sand. Exacerbating the problem was the fact that the Easter Holidays were a mere days away! The "Shades" team got to work as soon as it was safe to venture onto the beach. Working 12 hours a day, the facility was running at 95% capacity by Easter weekend – a remarkable feat! The owner explains: "I knew I had an obligation to the public, who had come to rely on our service. I also have an advertising agreement with a major national newspaper, which I intended to honour." Damages to the Lazy Shades totaled around R100 000.

The Association wishes to thank Desere Strydom this article.

MISCONCEPTIONS

Miss Conception puts it "straight"

"Miss Conception" rectifies incorrect impressions concerning hot dip galvanizing.

When ordering steel that requires to be galvanized after fabrication, all that is required, is to specify a quality steel grade (e.g. 300WA) and no problems will be encountered by the galvanizer in achieving the required coating standard.

True or false?

The main purpose for purchasing steel to an approved standard is to ensure that the mechanical properties of the steel after fabrication are suitable for the intended use of a product. In order to achieve this, the level of certain elements within the steel are required to be within specified limits.

In general, the elements added to steel intentionally will not have a significant influence on the quality of the galvanized coating achieved by an approved hot dip galvanizer. An exception to this can be the presence of elements such as silicon, phosphorus and to a lesser degree, manganese and carbon.

With the exception of silicon, the presence of the other elements will not significantly affect the coating quality provided that the steel is produced to an acceptable quality standard.

Silicon is added to molten structural steel as a deoxidising agent during manufacture and in most cases for no other reason. An alternative deoxidising agent is aluminium which is used by some steel mills. The terms used are silicon killed or aluminium killed steels.

The presence of aluminium has no affect on the coating growth during immersion in molten zinc, whereas, depending on the silicon level, silicon can have a very significant influence on the properties of the galvanized coating ultimately achieved, which results, at certain levels, in the undesirable formation of excessively thick and brittle iron / zinc alloys in the coating.

The situation is somewhat complex in that it is not a case where the higher the silicon content, the more reactive is the iron with molten zinc. To illustrate, at a silicon level of 0.08%, thicker coatings will result at a given zinc temperature and immersion time cycle than, for example, at 0.15% Si content, whereas at 0.3%, coating growth is similar to that at 0.08%. This was first observed by Sandelin, the Swedish research scientist after whom the well known Sandelin curve is named.

This problem is exacerbated by the fact that the structural steels may contain silicon at levels anything from a trace up to about 0.35% and still be acceptable as far as the steel specifications are concerned.

The influence of phosphorous can be extremely severe at high levels. In contrast to silicon, the higher the phosphorous content, the greater the reactivity of the iron with molten zinc i.e. there is no Sandelin effect.

What then is the solution? If a hot dip galvanizer is aware that he is required to galvanize a reactive steel, he can reduce the molten zinc temperature slightly, add a small quantity of aluminium and ensure the shortest possible immersion time cycle in the zinc. It should however, be borne in mind that shortening the immersion time in closed tubular sections is directly related to vent and fill/drainage hole size. These measures certainly assist in the provision of an acceptable coating but they can only be implemented if the galvanizer is aware of the steel analysis.

Strictly speaking, SANS 121 (ISO 1461) – Annex A, requires that the purchaser supply certain relevant information to the galvanizer at the time of contract. This information includes disclosing the chemical composition of the steel.

In the case of large orders, the fabricator should provide the steel suppliers with a required limit in the steel content of both silicon and phosphorus. The other elements i.e. manganese and carbon are rarely at undesirable levels. For details regarding the levels of elements to render steel to be ideally suited for galvanizing, contact the Association or alternatively a respectable hot dip galvanizer.

We wish to thank Walter for his contribution, may there be many more!

FEATURES 2007

AUGUST/SEPTEMBER

The Annual Awards Event; masts and poles; traffic signs and sign gantries; scaffolding.

NOVEMBER/DECEMBER

Mining and quarries; gratings; overland conveyors; fasteners; architectural hot dip galvanizing.

Pro-Galv commences business

Pro-Galv cc was officially inaugurated by Mr Bob Wilmot, Executive Director of the HDGASA on 23 February 2007. The founding members of the Close Corporation are Mr Gerhardus Wendt (Managing Member) and Mrs Vannesa Rhoda (Member).

Mr Gradus Wendt was the previous owner and Managing Member of Zincgrip Coatings cc, which was also situated in Stikland, Cape Town. The kettle size of this plant was 4.5mL x 2.5mD x 1.0mW, which was sufficient at the time (1998).

After a few years it became abundantly clear to Mr Wendt that the volumes of steel for hot dip galvanizing had picked up considerably to the point when the premises became too small.

Mr Wendt saw this as an opportunity to expand the business and decided to purchase land in order to put up a bigger, better and more modern galvanizing plant. Due to the history surrounding Zincgrip Coatings and the fact that new investors were interested in a new business venture, the decision was made to start a new company. This gave rise to Pro-Galv cc.

From a technological perspective, the plant is seen to be advanced, with some of the essential equipment being 2 independent thyristor drives for kettle control, 11 pre-treatment polypropylene lined concrete tanks and two overhead Demag cranes especially treated for an aggressive environment. Pro-Galv cc also has a stack filtering system in place in order to reduce atmospheric emissions.

The new Pilling Kettle size is 7.2mL x 2.6mD x 1.3mW.

We wish to acknowledge and thank Bob for his input and technical support during the design process of the plant and also for accepting our invitation to officially unveil the company plaque during our pre-opening ceremony on 23 February 2007. The event was attended and thoroughly enjoyed by both our top clients and suppliers. A special word of thanks to Terry Smith, who was always a phone call away and willing to assist us with the "teething problems".

It is our mission here at Pro-Galv, to promote Hot Dip Galvanizing and to improve on the standard of Galvanizing quality and service at all times.

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

Zinc Market Update

Owen Tennant – Manager: Marketing, Zincor, Exxaro Base Metals

During 2006 the zinc price increased dramatically throughout the year. This was on the back of large price increases in all base metals. The main reason for this price increase was the shortage of raw materials to convert into metals and the strong demand for metals in the market.

At the start of 2007 LME zinc stocks started to stabilise and the zinc price dropped from $4 000 to close to $3 200 in the first quarter of 2007. This downward trend was not to continue throughout the year and pressure on LME zinc stocks has again has moved the zinc price to the $4 000 level.

The Rand zinc price has moved up sharply during April / May; however the strong Rand, at less than the R6 / USD has softened the Rand price increase to some extent. The Rand zinc price is likely to remain volatile throughout 2007.

Zincor will again be having a rebuild of one of its roasters. This will take place over a three month period from mid June 2007. Zincor have imported additional zinc at the start of 2007 to cover the reduced production that will be experienced during this shut period.

Robor adds Africa's deepest kettle to widest and one of the longest

Robor Galvanizers, the largest general galvanizer in South Africa, has passed another milestone as a world-class galvanizer in March this year – it now offers one of the longest, widest and deepest kettles in the country, all on one site in Germiston. This follows the completion of a new 10m long kettle that is 2m wide and 4m deep, to replace the company's 7.5m 'Tank Line'.

"The benefits of providing such a facility to the fabrication industry are numerous," explains Riaan Louw. "Design and fabrication constraints on large and bulky products for hot-dip galvanizing have been significantly reduced. We are now able to hot-dip galvanize certain products which previously had to be painted, due to facility constraints."

Apart from offering the most comprehensive galvanizing capabilities on the Continent, Robor's latest kettle notably increases the company's throughput and turnaround times, resulting in quicker delivery – even on large orders – to clients. The new kettle also eliminates the need for double-dipping on fabricated items between 2.3m and 3.8m in height, resulting in better quality finishes at a lower cost. Efficiency is further improved via a re-design of the heating configuration, making the process more cost-effective and environmentally friendly.

Robor Galvanizers now operate 3 kettles, 2 for general galvanizing and the 3rd being an automated small bore pipe processing line. The company galvanizes on average 55 000 – 65 000tpa, depending on market activity levels.

The company's main galvanizing line, one of the longest in the country, was designed to efficiently process products of up to 13.8m on a single dip basis, but is also capable of successfully doing longitudinal double dips on lengths up to 18.5m. At 10m x 2m x 4m deep, this is one of the largest electrically heated kettles installed worldwide and has a throughput capacity of 18 tons/hour.

Line 2 is ideally suited for galvanizing tanks, chutes, mast base sections, and other 'wide' articles, while the recently completed 3rd kettle, with dimensions of 10m x 2m x 4.0m is now the widest in the country.

Demand for hot dip galvanizing of fabricated steel in the local market lies at around 350 000tpa at present, and is largely driven by the mining and resource industries, building and construction, along with infrastructural development driven by government and aided by such events as the 2010 Soccer World Cup, to be held in South Africa. In recent months, Eskom's power generation initiative expansion of petrochemicals plants and railroad reticulation have also had a positive impact on the demand for hot dip galvanizing.

There are 35 general galvanizers in South Africa, with the Central Region accounting for 68% of demand, the East Coast 17%, and the Southern Coastal Region 15% of demand.

Demand in the Central Region has been built up over 40 years, mainly around activity in the mining industry, and particularly mining project work such as mine shafts, concentrators, pipe work and surface facilities.

Aiming to establish a sustainable competitive advantage in a fluctuating market prompted Robor to create new demand in an untapped market. The demand for fencing type materials, in excess of 2.5 m in height, along with many other fabricated products displaying width and height dimensions which could not be accommodated in existing galvanizing kettles, indicated that an opportunity existed for a facility to accommodate such products on a vertical single dip basis, as opposed to vertical double dipping. This lead to the decision to construct a new kettle.

"Management believed that the overall solution to the various issues lay in identifying and introducing a dynamic into the South African Hot Dip Galvanizing Industry that would change the face of the industry," says Louw.

The pre-treatment process consists of 10 tanks of which 6 of the tanks are double tanks (4m wide) and 4 single tanks (2m wide), all being 4m deep and 11m long.

The new pre-treatment facility was designed and constructed in such a way that all possible precautions were taken to minimise the potential for any environmental contamination.

The first tank is a double degrease tank consisting of a heated caustic solution. This solution is used to remove all greases and oil contamination on the steel. This double tank is then followed by 2 single rinse tanks for neutralising the product after exposure to the alkaline solution.

The following four tanks are double hydrochloric acid tanks in which the steel is pickled to remove all traces of rust and mill scale. All the acid used at Robor Galvanizers is regenerated by Metsep SA, eliminating the need to dump or treat the acid at huge costs.

After the steel has been chemically cleaned in the hydrochloric acid solution it is then rinsed in two single tanks to remove any possible contamination from the pickling acid to the flux tank, which is also a double tank.

The flux solution protects the steel surface from oxidisation after pickling and also assists in the metallurgical reaction between the steel and the zinc.

The biggest benefits derived from this increased capacity is a throughput improvement of approximately 1000 tonnes per month, the possibility to do much larger structures and the improvement in quality of products that used to be double dipped.

NOW WITH CPD POINTS

Coating 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 Coating 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 will be run from the Hot Dip Galvanizer's Association Offices in St. Andrews, Bedfordview. Bookings are limited (maximum 20 people) and will be treated 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, on the following dates in 2007: March 6 & 7; May 8 & 9; July 10 & 11; September 4 & 5 and November 6 & 7.

Lunch and refreshments will be provided. Comprehensive course notes can be collected from our offices two weeks before the course.

COURSE COST AND PAYMENT TERMS

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

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

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

7th Asian Pacific General Galvanizing Conference

The Chinese Society for Corrosion Protection invites you to participate in the 7th Asian Pacific General Galvanizing Conference to be held at the Beijing Landmark Towers in Beijing, China from 14 to 17 September 2007.

Should you wish to attend this important conference, deadline for pre-registration is 30 June 2007.

An exhibition in association with the conference providing an opportunity for service providers will also be held.

Registration fees

(*before June* 31)	–	US *Dollars* 750
(*after August* 31)	–	US *Dollars* 800
Accompanying person	–	US *Dollars* 200

Full registration fees include participation in all technical sessions, a booklet of abstracts, the proceedings on CD-ROM, the welcome reception, lunches, the banquet and a one day local tour.

Contact the Association or visit the web site – www.7apggc2007.com for further details.

Mexico launches zinc-enriched milk

The federal government of Mexico is now distributing a new fortified milk especially prepared for the nutritional needs of children. Sold under the name *'Tenutre – the milk for boys and girls'*, the milk is fortified with iron, zinc and vitamins A, B2, B12, C and D. Sold in liquid as well as powder form, 'Tenutre' is distributed by Liconsa, an agency of the Secretariat for Social Development, and will be available throughout the country by the end of this year, thanks to the distribution network of 8 000 Liconsa dairies. The new milk, which aims to improve the nutrition of more than 4.5 million children, is the result of a one year development program that stemmed from the 1999 National Nutrition Survey. The survey found that a large percentage of children presented symptoms of nutritional deficiencies, including anaemia, growth retardation and diminished resistance to infection.

Thanks to Jaime Lomelin, Met-Mex Peñoles, for contributing this item. See also: http://www.mural.com/nacional/Articulo/205710/

The Association hosted its annual Golf Day at the Reading Country Club on Tuesday 13 March 2007.

The Floating Trophy was presented to the team from Robor Galvanizers, who with a score of 55 secured the trophy for the 2nd consecutive year. Well done to Andre, Benny, Shaun and Colin.

The team from Supergalv won the Pink Lady competition, sponsored by Off the Edge Marketing. With not many yellow golf balls making their way back to the clubhouse after 18 holes; Gary, Ian, Frits and Eugene deserve their win!

Second and third place, with even scores of 54, was determined by a count out. Second place went to the team consisting of Edzard, Vincent, Ted and Riaan from Robor Galvanizers.

The team from Armco Galvanizers secured third place. Congratulations to Les, Allan, Graeme and Anthonie.

Unfortunately someone needs to be at the back of the field and this year, with a convincing score of 25, the award for Longest Day went to Kevin, Hastig, Richard and Ashley of Babcock Nthuthuko Powerlines.

Both the Longest Drive and Nearest the Pin, sponsored by Robor Galvanizers and Duplex Coatings respectively, had to be awarded by a lucky draw due to an oversight on the clubs part.

Thank you to our sponsors, listed in alphabetical order, without whom a successful day would not be possible:

● Armco Galvanizers ● Babcock Nthuthuko Powerlines ● Darren Millington Pro Shop ● Duplex Coatings ● Kumba Base Metals – Zincor Ltd ● Lianru Galvanisers ● Off The Edge Marketing ● Orlik Metal Chemicals ● Robor Galvanizers

And lastly, but certainly not least, thank you to all those who supported our Golf Day by attending!

HOT DIP GALVANIZING MEMBERS

GALVANIZER	LOCATION	TEL. NO	SPIN	NO. OF LINES	BATH SIZES (L x W x D) (m)
GAUTENG					
Armco Galvanizers	Isando	011 974-8511		1	13.2m x 1.5m x 2.2m
Armco Galvanizers – Dunswart	Dunswart	011 914-3512	●	3	5.2m x 1.2m x 2.0m 3.0m x 1.0m x 1.5m 2.0m x 1.0m x 1.5m
Babcock Nthuthuko Powerlines (Pty) Ltd	Nigel	011 739-8200		1	12.0m x 1.4m x 1.8m
Cape Gate (Pty) Ltd	Vanderbijlpark	016 980-2270		#	Wire galvanizer
DB Thermal SA (Pty) Ltd	Nigel	011 814-6460		In-line	16.0m x 1.0m x 1.0m
Galvadip (Pty) Ltd	Waltloo	012 803-5168		1	7.2m x 1.5m x 1.8m
Galvrite Galvanising (Pty) Ltd	Randfontein	011 693-5825		1	6.5m x 1.3m x 2.0m
GEA Air Cooled Systems	Germiston	011 861-1571		In-line	11.5m x 1.0m x 1.0m
Lianru Galvanisers cc	Nigel	011 814-8658		2	7.2m x 1.3m x 1.6m 4.5m x 1.3m x 1.6m
Macsteel Tube & Pipe	Boksburg	011 897-2194		In-line	13.5m x 1.6m x 2.4m
Mittal Steel SA	Vereeniging	016 889-8816		#	Sheet galvanizer
Pro-Tech Galvanizers (Pty) Ltd	Nigel	011-814-4292	●	2	3.2m x 1.1m x 1.5m 3.0m x 1.1m x 1.2m
Robor Galvanizers (Pty) Ltd	Germiston	011 876-2900		3	14.0m x 1.35m x 2.5m 10.0m x 2.0m x 4.0m
				Tube	Dia 42mm to 114mm max tube length 6.7m
Robor Tube	Elandsfontein	011 971-1600		1	Tube & pipe galvanizer
Supergalv	Alrode	011-908-3411		1	6.0m x 1.2m x 1.8m
MPUMALANGA					
Chevron Engineering (Pty) Ltd	Barberton	013 712-3131		1	0.7 x 1.2d
NORTH WEST					
Andrag Agrico	Lichtenburg	018 632-7260		#	In-line galvanizer
FREE STATE					
Harrismith Galvanizing & Steel Profile	Harrismith	058 623-2765		1	12.0m x 1.2m x 2.5m
WESTERN CAPE					
Advanced Galvanising Corp.	Bellville	021 951-6242		1	8.0m x 1.5m x 3.0m
Cape Galvanising (Pty) Ltd	Parowvalley	021 931-7224		1	14.0m x 1.6m x 2.6m
Galvatech (Pty) Ltd	Bellville	021 951-1211		1	7.5m x 1.5m x 2.6m
Helderberg Galvanizing	Strand	021 845-4500		1	5.5m x 0.8m x 2.4m
Pro-Galv cc	Stikland	021 945-1803		1	7.2m x 1.3m x 2.6m
South Cape Galvanizing (Pty) Ltd	George Industria	044 884-0882		2	5.5m x 1.0m x 2.6m 3.7m x 0.94m x 2.3m
EASTERN CAPE					
Butterworth Metal Industries	Butterworth	047 401-3600		1	1.2m x 0.6m x 0.8m
Galvanising Techniques cc	Port Elizabeth	041 486-1432		1	12.0m x 1.3m x 2.3m
Galvaspin (Pty) Ltd	Port Elizabeth	041 451-1947	●	1	3.0m x 1.2m x 1.8m
Morhot (Pty) Ltd	East London	043 763-1143		1	6.0m x 1.2m x 2.5m
KWAZULU/NATAL					
A&A Galvanisers	Pietermaritzburg	033 387-5783	●	1	3.3m x 0.9m x 1.9m
Bay Galvanisers	Richards Bay	035 751-1942		1	5.0m x 1.2m x 2.5m
Phoenix Galvanizing (Pty) Ltd	Phoenix	031 500-1607	●	2	14.0m x 1.4m x 2.5m 3.0m x 1.2m x 1.2m
Voigt & Willecke (Pty) Ltd	Durban	031 902-2248		1	9.0m x 1.2m x 2.5m

The bath dimensions provided in this schedule are actual dimensions. Please check with your galvanizer the actual component size that can be accomodated, either in a single dip or by double end dipping.

 # Sheet, Wire, Tube and In-line galvanizing members dedicate their plants to the galvanizing of their own products.

For specific contact names (eg. sales or production personnel) and mobile telephone numbers, kindly contact the company receptionist.