

HOT DIP

# Galvanizing



66

TODAY

Hot Dip Galvanizers Association Southern Africa

2017 Volume 14 Issue 2



## ADDING VALUE TO STEEL



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Transvaal Galvanizers was founded in 1984 by the Managing Director of Imab Engineering with the vision of creating a full turnkey operation when it came to the need for supply of corrosion protected steel articles. With Imab Engineering at the forefront, this expansion into the galvanizing industry would one day become the biggest galvanizing plant in Africa.

With Transvaal Galvanizers celebrating their 33<sup>rd</sup> birthday this year, it is time to look back, standing on the threshold of this milestone, to the journey that has led us here.

Over the last 33 years, Transvaal Galvanizers has galvanized over a million tonnes of steel. This is equivalent to 165 000 Bull Elephants OR 3 676 Boeing 747's OR 137 Eiffel Towers OR 68 Brooklyn Bridges.

While looking back we are extremely proud of our history and our heritage, but looking forward is much more important to us. One man that is always looking forward is the Director of Transvaal Galvanizers, Francesco Indiveri. With Mr Indiveri at the helm, Transvaal Galvanizers has expanded into new markets focusing extensively on renewable energy projects.

With this in mind as well as the need for a larger galvanizing kettle in the industry, Transvaal Galvanizers has commissioned the biggest galvanizing plant in Africa in 2017. The size of the kettle is 15.5m L x 2m W x 3.2m D. This will provide steel manufacturers in the industry the flexibility of manufacturing larger items whether it be structural, solar, piping, reinforcing to name a few, without the cost implications of double dipping, forcing costs of projects to rise.

Not only will our upgraded facilities provide for a much greater capacity being 10 000 tonnes per month, but they incorporate state of the art equipment aiding in a greener, more environmentally friendly galvanizing process from start to finish. The upgrade incorporates 16tonne crane capacity with the advantage of crane off loading and loading of trucks, to ensure more efficient deliveries and dispatches for our customers.

Our facilities also include a shot blasting workshop, painting workshop, pre and post inspection, multiple approved repair processes, onsite offices for larger projects as well as an onsite boiler workshop where we manufacture and design new methods of dipping and jiggling customer steel.

We constantly aim to continually improve ourselves by adapting to changing times and markets whilst ensuring that we always stay focused on client satisfaction. It is this focus that has brought us to where we are today, and we know that this focus will take us to even greater heights over the next 33 years.

**With qualified, experienced and driven personnel at our forefront, we are your one stop shop when it comes to corrosion protection.**

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

#### PUBLISHED BY:

Hot Dip Galvanizers Association Southern Africa

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## Executive Director's Comment



As we go about our daily routines, we all hold an expectation that others will behave in a fair and equitable way towards us. This starts with the morning commute, during which our lowest expectation is that our fellow road users will respect the rules of the road. In addition, courtesy and patience toward drivers wishing to change lanes or those wishing to maintain an appropriate following distance

would add to a safe commute and help all to start the day in a positive frame of mind.

The theme of the above paragraph is one of expectation. There are two tiers of expectation here, the first being a minimum standard and the second being the hope of an even higher level of behavior.

For disappointment to be avoided, there are two aspects of managing expectations that are very important. The first of which is to express clearly what it is that "I expect of you". The second element is what does the second party intend to deliver. These expectations and views of what is reasonably required may vary according to personal values so it is obvious at this juncture that the quality of communication before the event is critical. It is mostly true that communication before the event sets the tone for the relationship. So, if a driver signals the intention to change lanes and a courteous driver waves them across, the event takes place smoothly. No stress or anxiety is experienced by either party. In contrast to this, when if there is no signal and the lane changer forces into a gap in the traffic, the quality of communication usually degenerates rapidly and may in extreme circumstances lead to aggressive retaliation.

There are very strong parallels between the above example and the way in which business is done. With regards to hot dip galvanizing, standards such as SANS121:2011 relates to general batch galvanizing, SANS 675 OR 935 for wire, EN 32 for tube and pipe through and automatic process and BS EN ISO 10684 for fasteners. These standards may be equated to the "rules of the road"

The Hot Dip Galvanizers Association offers courses and training sessions to ensure that these "rules of the road" are clearly understood by all parties. We encourage Engineers, Architects, designers, fabricators as well as galvanizing plant personnel to participate in these courses. This plays a big role in the upfront communication and management of expectations.

The Association also encourages the Hot Dip Galvanizing fraternity and its partners to look beyond "the rules of the road" In today's competitive environment, ensuring that customers have an understanding of the standards for galvanizing and then delivering in accordance to meet the agreed expectations. This is the minimum requirement for survival. Those that choose to develop their operations on a cost down, quality up principle and hence exceed customer expectations will develop a competitive edge.

*Robin Clarke*

## The BRT Cable Stay Bridge – Bridging the Alex, Sandton divide

The HDGASA attended a presentation and walk about by WBHO of the BRT Bridge constructed between Alex and Sandton as part of the Rea Vaya network extension. This new route will connect Alexandra not only to central Johannesburg but also to its historically segregated neighbour, Sandton, catering to the estimated 10 000 people who walk or cycle daily between Alex and Sandton. The bridge not only offers Alexandra's residents the affordable, convenient option of commuting using the Rea Vaya Rapid Bus Transit System to Sandton and back; it also provides a conjoined pedestrian walkway catering to the vast majority of users crossing the historical Alexandra-Sandton divide.

### Overview

From ramp entry to ramp exit, the BRT flyover stretches approximately 255 metres, including the 83 metres spanned by the cable-stayed bridge itself. The bridge roadway is an exceptional road, 9 metres wide, with the two doubly braced main pylons designed to support the cables standing a formidable 52 metres in height. This major engineering and construction project was overseen for the City of Jo'burg by the Johannesburg Development Agency (JDA) and constructed by WBHO.

### The use of galvanizing

In keeping with the design intent, hot dip galvanizing was used to ensure the longest service life possible for all crucial elements of the



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structure. Hot dip galvanizing was done in accordance with SANS 121:2011 (ISO 1461: 2009) by local galvanizers.

**Conjoined pedestrian walkway**

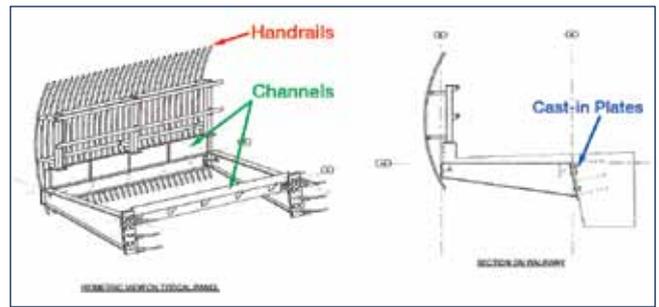
The pedestrian walkway was designed as a bolt on extension to the main bridge super structure with hot dip galvanized support beams carrying the mass of the walkway and the pedestrian traffic over the M2 motorway. The pedestrian walkway guardrails and hand railings have all been hot dip galvanized. This low maintenance and cost effective corrosion control technology is imminently suitable for the application. Furthermore the dull grey patina that forms from weathering of the galvanized coating will provide a pleasing aesthetic to the bridge.

The hand railings and stanchions sections were specifically designed to best provide for the full benefits of hot dip galvanizing. To this end, all interlocking elements were sturdily constructed with the minimum need for fasteners, with welded joints being all but eliminated. The slip joint design allows the hot dip galvanized elements of the hand railing to neatly fit within each other providing excellent strength and corrosion control at the joints.

**Load bearing anchors**

The anchor structures are vital elements designed specifically to function as the main load bearers of the bridge’s support structure. The decision to hot dip galvanize the anchors was driven by the need for effective corrosion control to ensure the integrity of the anchors over the longest service life possible.

In such applications, hot dip galvanizing provides ideal corrosion control for steel – no other coating matches hot dip galvanizing’s unique combination of lowest lifetime costing, ease of inspection for coating quality, durability, predictable performance, low maintenance and the superb resistance of the zinc carbonate barrier to abrasion and virtual impenetrability to moisture.



**THE WBHO Team**

*Back row: Alan Edmunds, Hendrik Fourie, Shane van Jaarsveld, Michael Mujakachi, Dumi Ngwenya, Eric Msomi, Nicol van Rensburg, Peter Dittberner, Stoffel du Plessis, Christopher Selota, Jurie Cordier.*

*Middle row: Olga Serurubele, Christiaan Coetzee, Jaco van Staaden, Hugu Greeff.*

*Front row: Zwele Kambule, Milton Chinowaita, Brandon Murray, Wiseman Madikane, John Shum, Sam Kwenane, Jason Olver.*

*Absent: Shaun Hattingh and Isaac Siebert.*

**Project Information**

**Client:** Johannesburg Development Agency

**Contractors:** WBHO

**Contract Value:** circa R210 000 000.00

**Location:** Sandton

# The new generation anti corrosion arc spray system

The OC350 is a compact and powerful arc metal spray system that specialises in the application of zinc and aluminium spray wires, used in the field of corrosion protection.

The power source with its transformer-rectifier system is designed with its characteristics specific to arc metal spraying. Generously dimensioned power components allow a continuous spray operation, ensuring a 100% duty cycle. Convection ensures sufficient cooling of the power source and metal dust contamination is reduced to a minimum.

The OC350 is equipped with a PLC control system, which monitors all

spray parameters thereby facilitating reproducible coatings.

The compact design of the OC350 together with large castors, which can be fixed in place, allows for easy maneuvering of the power source, even under tough on-site conditions. The newly developed DC power connectors from OSUCAS offer a low-loss power transmission with minimum heat generation at the terminals due to their large contact surface.

The OSUCAS modular component system, allows the OC350 arc metal spray system to be configured to customers specific requirements. Typical configuration features are the length of the cable and

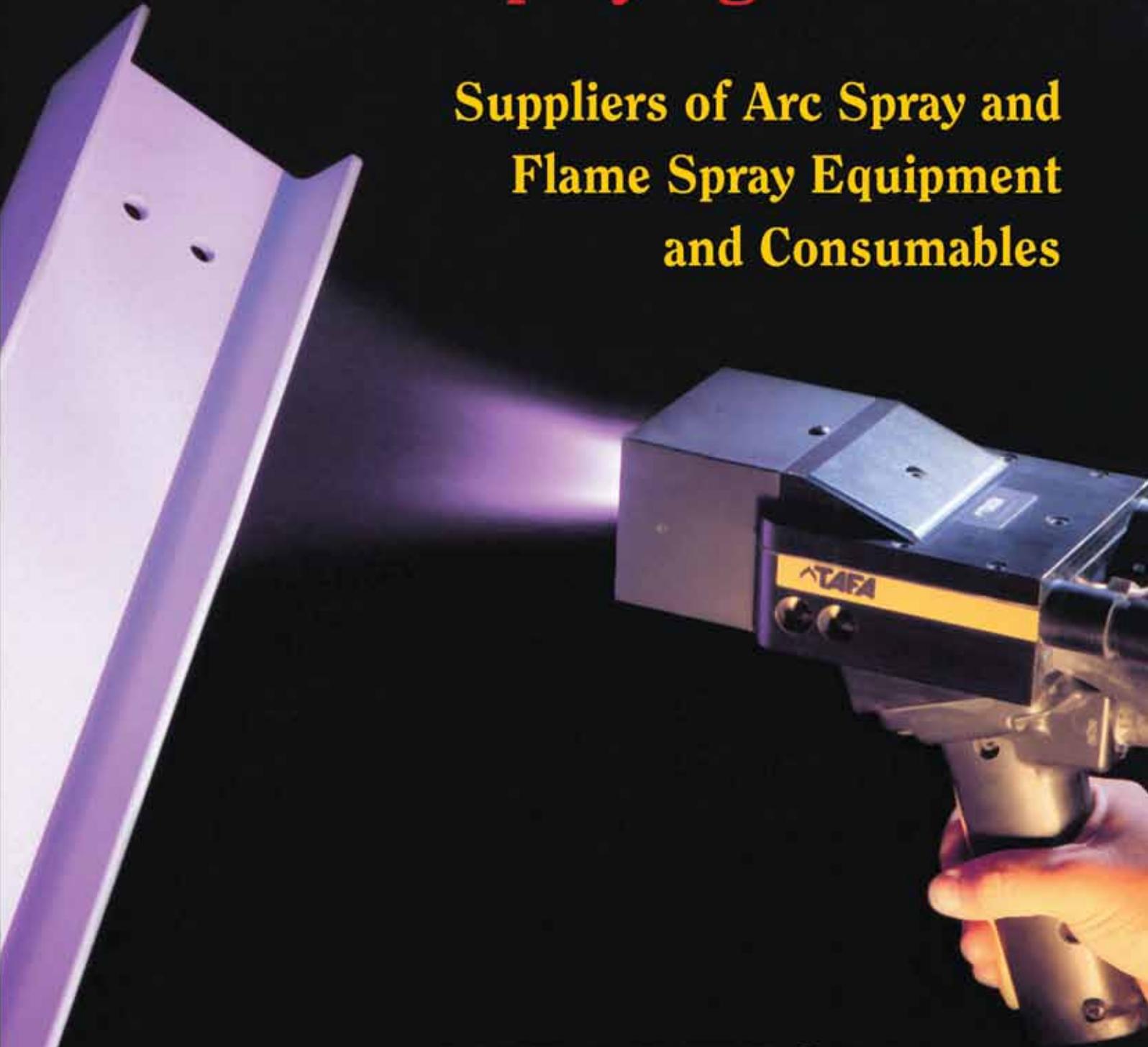
hose set (up to 20m with push-pull wire feed), the choice of the spray device and the mode of operation (hand-held, automated spraying or switchable version).

*For more information, kindly contact Adam Wintle on 011 824 6010 or email: adam@weartech.co.za.*



# Zinc Metal Spraying?

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# THE ECONOMIC BENEFITS OF PICKLING WITH ACID LIFE EXTENDER

Gideon Hugo Pr Eng

*A proprietary chemical product, Acid Life Extender, has been available in South Africa for the past several years. The product finds application in acid pickles used in the metal finishing industry. Processes like hot dip galvanizing, wire galvanizing, anodizing, electro-polishing and electroplating can all benefit from its use.*

The product is added to an acid pickle bath, preferably a newly made up one, in the ratio of 1% of the volume of the bath (a double strength product is also available, with addition of 0.5%). Any further concentrated acid additions, to maintain the acid concentration, must also contain 1% Acid Life Extender of the added volume.

The Acid Life Extender converts the soluble metal in the pickle bath to insoluble metal silicates that can be filtered out. The metal concentration in the pickle stabilizes and the pickle does not have to be decanted, dumped or recycled.

To filter out the solids formed by the reaction in the pickle tank an adequately sized filtration system must be added. For smaller volumes filter units with cartridges can be used, but for larger volumes an automatic backwash plc controlled filter unit is needed.

Such a filter unit can have one to four filter chambers.

The backwash cycle is initiated by a pre-set pressure, or a timer (typically 1.5h). Chambers are backwashed sequentially, with the filtration being maintained in the chamber(s) not in a backwash cycle.

At the start of a backwash cycle, the inlet to the chamber is closed, and the chamber is air purged back to the pickle tank to prevent any loss of acid. Thereafter the chamber is backwashed with mains or pumped rinse water, to waste. After the backwash cycle the chamber is again air purged, to waste, to clean out any remaining water. Thereafter the inlet valve is opened, filtration is started again, and the next chamber starts its backwash cycle. The chambers can each hold 2kg of solids.



*Two chamber automatic back wash filter.*



## ACID PICKLE – NO MORE DUMPS OR REGENERATION!

Convert your acid pickle bath (hydrochloric, sulphuric, phosphoric) with **SURPICKEL AEX** additive, add a filtration system, and **NEVER DUMP OR REGENERATE AGAIN.**

The **SURPICKEL AEX** drops the metals in your pickle (Fe, Zn, Al, etc) out as insoluble salts that can be filtered out. The metal concentration in the pickle stabilizes and you just add concentrated virgin acid, treated with **SURPICKEL AEX**, and filter.

**HUGE COST SAVINGS** can be achieved by using concentrated virgin acid treated with **SURPICKEL AEX** and filtration.

*Payback period for initial capital outlay is typically 6 to 9 months.*



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**RANDS AND SENSE?**

The figures below are based on production of 30 000tons/year/line and ‘realistic’ hypothetical day unit costs.

16% HCl consumption: 25kg/t  
 Cost per year @ R1.80/kg: **R1 350 000.00**

30% HCl consumption: 5.7kg/t  
 Cost per year @ R0.75/kg: **R128 250.00**

Acid Life Extender 2X consumption: 0.0248l/t  
 Cost per year @ R350.00/l: **R260 400.00**

Electricity consumption: 222kWh/week  
 Cost per year @ R0.70/kWh: **R7 459.20**

Water consumption: 20.2kl/week  
 Cost per year @ R17.77/kl: **R17 229.79**

Total cost per year with Acid Life Extender: **R413 338.99**

Cost Saving per year: **R936 661.01**

Cost Saving per month: **R 78 055.08**

Percentage Saving: **69%**

The capital cost associated with the introduction of the Acid Life Extender in the acid pickle and filtration:

- initial Acid Life Extender make-up
- filter and pumps
- electrical connections
- pipework, tank conversions, valves, etc

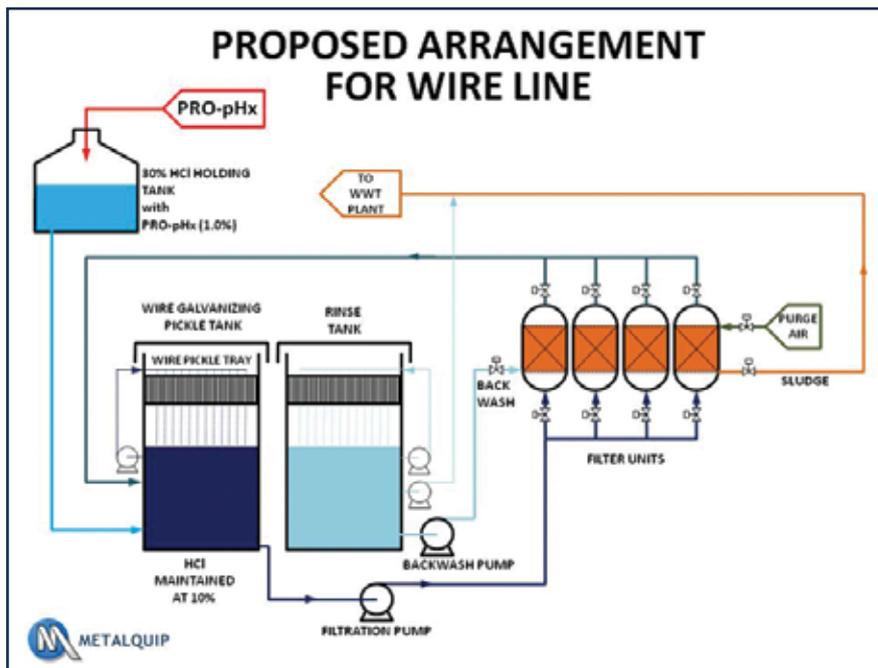
The investment is able to be recovered within a period of 6 to 9 months based on the above calculations.

**“ON THE WIRE” – A CASE STUDY**

A South African company with wire galvanizing lines, each producing approximately 30 000tons/year, installed an automatic backwash filter system with 2 chambers on one line and introduced the Acid Life Extender Double Strength chemistry in the associated pickle tank.

The pickling was traditionally done with 16% regenerated HCl. Concentrations normally varied from 14 to 7% with the Fe concentration typically 7%.

With the Acid Life Extender the HCl concentration was maintained at 10%



by adding 30% virgin HCl treated with Acid Life Extender. The Fe concentration stabilized at 7 to 8%.

Mains water was used for the backwash. There is no drag in to the pickle tank as the wires enter dry. It is important to have more drag out than drag in to enable acid additions without having to decant.

With the acid concentration maintained at 10%, compared to the previous average higher concentration, the neutralization-costs of the rinse water is therefore reduced.

Initial problems were experienced with the filtration, caused by calcium solids in the acid pickle, coming from the calcium based wire drawing soap. The filter gradually managed to clean the acid adequately to cope with the load of metal silicates and calcium solids.

Another problem was experienced with the back wash water. Initially rinse water that normally goes to the WWT plant, was pumped for back wash cycles. However, the volumes were not adequate, and mains water had to be used for back washing. This problem is addressed below. The volume of back wash water is typically 60l per chamber per back wash.

The consumptions and operating parameters were closely monitored and compared with previous results on that line and another similar line using 16% regenerated HCl and periodic decants. The quality of pickle and galvanizing with the converted line was no different from the past.

The acid consumption on the 16% regenerated HCl line averaged at 25kg/t. This equates to 12.5kg/t 30% HCl.

The acid consumption on the 30% HCl top up line stabilized at 5.7kg/1 30% HCl.

The cost benefits were substantial and are set out below.

In the light of the economic benefits associated with using Acid Life Extender, 30% virgin acid and filtration, management decided to convert a second line to Acid Life Extender chemistry with 30% HCl top up and filtration. That line will be commissioned in April 2015.

With two lines operating on the Acid Life Extender and filtration, a rinse water buffer sump will be introduced with back wash water pumped from the buffer tank for each of the two filter units. This will introduce further savings as mains water will not be used.

# Central Support Systems – 21 years and growing

Through 21 year of steady progress Central Support Systems has become one of the major suppliers in the commercial sector of the mechanical and electrical support systems industry. From humble beginnings, entrepreneurs Ted Hinton and Ricky Hoosen started the company in April 1996. The young start-up commenced operations with three staff members, a small premises and a bakkie.

The company began by targeting and supplying the SME sector of the market. The company began to grow as it built a reputation for exemplary service and product back up through persistent hard work and excellent customer service. It now supplies contractors involved in extremely large projects such as Soccer City, Discovery Head Office, Medupi Power Station and The Mall of Africa. Central Support Systems now boasts a staff complement of in excess of 70 personnel.

When asked about the company's mission statement, Mr Faruk Cassim the Sales Director said, "The company prides itself on always putting the customer first. We strive for this from the bottom right to the top. We find transactions with satisfied customers naturally fall in place beginning to end." Emergency deliveries at unusual hours or with extremely short lead-times are not uncommon, as many of the operational staff can testify to.

During January 2017 the company moved from its original premises in Newtown, Johannesburg to its newly renovated premises in

Robertsham, Johannesburg South. Mr Colin Hinton, the Managing Director, explained that the company's new premises are four times larger than the old premises, which will assist Central Support Systems (CSS) to offer improved service to its customers.

Thanking their loyal customers for their support over the past 21 years, Mr Hinton affirmed, "We at CSS will continue to offer improved service over the next 21 years."



Internal sales staff (standing from L – R) Avi Boodram, Dianna Scheepers and Suliman Choonara with Faruk Cassim, Sales Director (seated).

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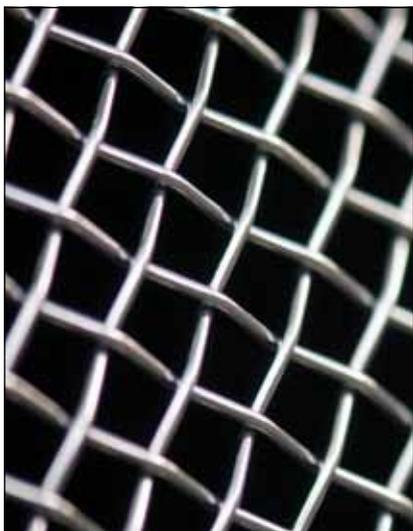


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Central Support Systems is the top Supplier and Leader of Electrical Strut and Cable Support Systems for the Commercial and Industrial Environment in Southern Africa

# Tips regarding galvanized wire fencing



Wire fencing is most often used in fencing off tracts of land in the agricultural, mining and industrial applications as well as residential plots. Wire fencing has traditionally been made of galvanized steel and comes in varying strengths and styles. A wide range of wire thicknesses are available as well as the varying mesh sizes appropriate to curtailing animal movement across boundaries. Welded wire fencing came about in 1901, when John Perry, an inventor from Massachusetts in USA, patented a machine that was able to weld together wires in sheet form

Fence posts are placed somewhere between 3 metres and 6 metres apart, depending on the type of fence being erected. In order to prevent the fence from sagging, a fence stretcher should be used to optimise the tension in the fence structure.

Most important in selecting the appropriate wire fence for your application is the galvanized wire coating. The HDGASA recommend only SANS 675 coating thicknesses should be used on fencing and other galvanized wire in "outside" applications.

The use of light galvanized is not routinely recommended. Being in nature, cognisance must be taken of any extraneous effects such as fire or excessive humidity due to tall grass coming into contact with the wire, which may compromise performance of light coatings. Should dry grass density in the region of the zinc coated steel wire fences not exceed 0.5kg per square metre no damage to the wires is likely to occur in the event of the grass being set alight. Conversely extensive damage to wires is highly likely to occur when dry grass with

a density of  $\geq 1$ kg per square metre is set alight and allowed to burn through the fence.

Barbs do not significantly affect the corrosion rate of the metal coatings on the wires. Binding wire used to fasten wire strand to posts or droppers should also comply with SANS 675. As a rule galvanized binding wire should not be thinner than 2.50mm.

The HDGASA also recommended that should wire be specified in accordance with SANS 935 ONLY Grade 1 (heavy) coating should be used for fencing. Under no circumstances should either Grade 2 (medium) or Grade 3 (light) be considered. To simplify matters, it is recommended that SANS 675 be used to specify all galvanized steel wire for fencing.

It is recommended that sufficiently sized samples of the specified wire be kept in appropriate low corrosive conditions for testing vis-à-vis any later concerns regarding functional service life in the event of perceived premature failure. These samples will be needed to determine if the galvanized coating was congruent with the specification requirements and delivered product. Such evaluation will require that the sample undergo destructive analysis techniques.

## OBITUARY

### LATHA RAMKISSON

Quality Assurance Director of Phoenix Galvanizing

Phoenix Galvanizing advised the association of the passing of Latha Ramkisson on 4 August 2017 after a long illness.

The Association and all members of the HDGASA send their condolences to Latha's family, colleagues and friends in this time of mourning.





# KROME

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# Why hot dip galvanizing and zinc rich paint & epoxies are NOT equivalent when it comes to corrosion control

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

The Hot Dip Galvanizing Association Southern Africa (HDGASA) itself has a vested interest in the business of corrosion control. The HDGASA's interests however extend beyond purely commercial aspects; relating rather to that of ensuring accurate informed technical knowhow for those seeking answers within the corrosion control arena.

## The fundamentals of steel corrosion

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

## The corrosion cell

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

1. Anode, from which electrons flow,
2. Cathode into which electrons flow,
3. An electrolyte, which will represent the

4. A return external electrical circuit.

In theory by completely removing any one of these four elements and we can effectively stop the process of corrosion. This of course is easier said than done.

Having briefly considered what constitutes a corrosion cell, we can now introduce the two "different" metals that comprise the specific corrosion cell appropriate to hot dip galvanizing namely zinc and carbon steel.

As a result of the relative positions of zinc and carbon steel within the galvanic series of metals, the zinc will always constitute the anode (being electro-negative to carbon steel) and carbon steel will thus be the cathode (being electro-positive to zinc). Using these two different metals within a corrosive environment (electrolyte) and by providing an electrical connection, we comply with the requirements for establishing a corrosion cell. It is for this reason that we define a corrosion cell as an electro-chemical reaction within its environment.

## Barrier protection

All forms of corrosion protective coatings applied to carbon steel provide one or other form of "Barrier Protection", separating the

corrosive elements within the environment (electrolyte), from making electrical contact with the carbon steel. Thus by fully coating and electrically insulating the carbon steel from the corrosive elements in the environment, we achieve this primary form of corrosion control. Having established the basics of a corrosion cell, as applied to two identified metals (zinc and carbon steel) and introducing the primary means of corrosion control, (being that of a barrier protection), we can now examine "How Zinc in particular Protects" carbon steel from corrosion.

## How does zinc (Zn) protect?

When we observe "new and clean" metallic zinc sample introduced to the atmosphere, it will undergo oxidation. Formation of unstable water soluble zinc oxides (ZnO), zinc hydroxides (Zn(OH)<sub>2</sub>), will occur, the degree of which depends on the atmospheric moisture content. Through interaction with atmospheric Carbon Dioxide an insoluble, dense zinc carbonate (ZnCO<sub>3</sub>) layer forms manifesting as a dull patina.

The primary products of corrosion, (ZnO & Zn(OH)<sub>2</sub>) are unstable, easily removed and provide no barrier protection. The ZnCO<sub>3</sub> layer, by contrast, is a stable, not easily removed; matt grey layer. It is this stable patina that forms the "Barrier Protection" of hot dip galvanized carbon steel. *Figure 3* is a simplified illustration of this process.

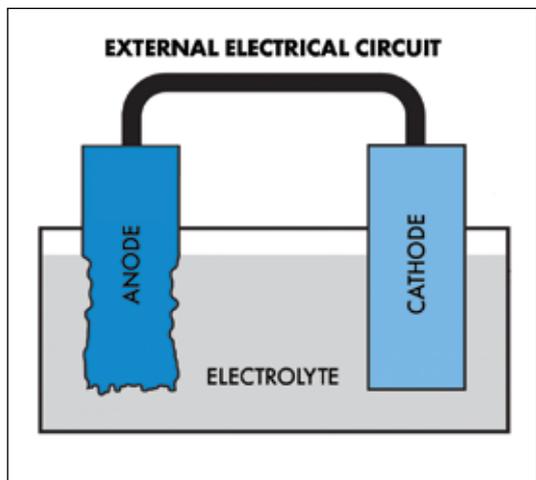


Figure 1: Components of a typical corrosion cell.

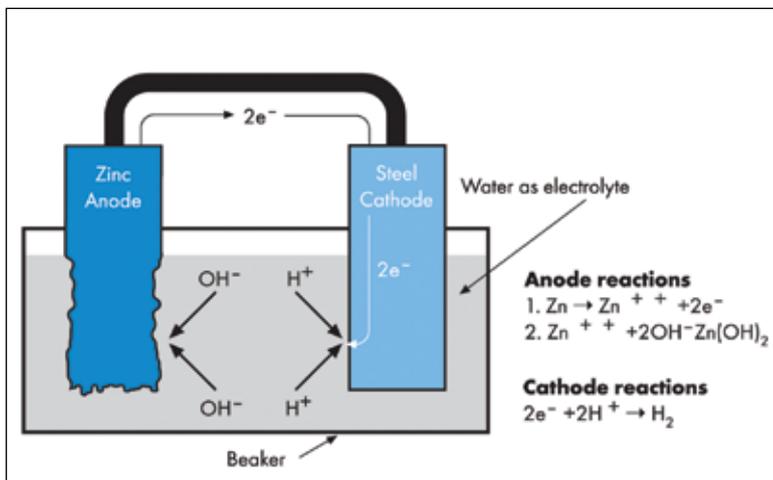


Figure 2 (above right): Note how the electro-negative zinc anode will sacrifice itself to protect the electro-positive carbon steel cathode. Considering the electro-chemical reaction between these two materials we can say zinc will provide cathodic protection to the carbon steel.

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We often refer to zinc as a “wasting” material, due to the fact that it will sacrifice itself to provide corrosion control of carbon steel. It therefore follows that the more zinc available (the thicker the coating), the longer the service life will last.

From Figure 3 we saw how zinc reacts (weathers) to form its barrier protection, viz. the ZnCO<sub>3</sub> patina. This is referred to as Zinc’s first line of defence against the corrosion inducing elements within a given environment.

In addition, unlike other paint and epoxy coating systems, Zinc has a second line of defence. Zinc (anode) being electro-negative to carbon steel (cathode), will provide cathodic protection of the carbon steel. This is also referred to as Zinc being sacrificial to carbon steel. The process is also referred to as a galvanic reaction and from which the term “galvanic corrosion” was derived.

**Comparing zinc rich paints & epoxies to hot dip galvanizing**

When it is claimed that zinc rich paint is equivalent to hot dip galvanizing, the claim is normally based on the fact that the paint, being organic or inorganic, contains zinc metallic dust particles.

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

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

The first two conditions are possibly met by zinc-rich coatings containing sufficiently high zinc content. The third condition is fulfilled when a steel panel bearing a zinc-rich

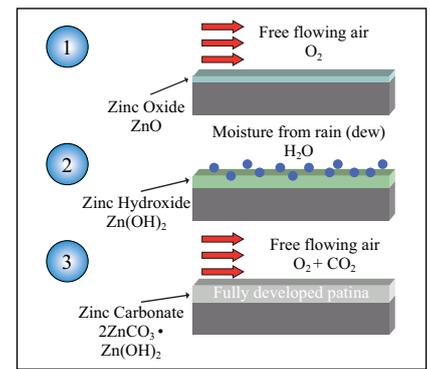


Figure 3: Pure “new zinc” reacts with the atmosphere (Oxygen, Moisture and Carbon Dioxide) and forms three products of corrosion. These corrosion products are zinc oxide, zinc hydroxide and zinc carbonate.

coating is wetted by a film of electrolyte such as a salt solution.

There are two stages in the protective action of zinc-rich coatings. The first stage is a relatively short period in which galvanic protection of the steel by zinc particles is in effect. After this period, the galvanic action between the steel and zinc gradually disappears. The second stage is a long-term barrier protection that is attributed to a greater resistance of the coating to the permeation of aggressive species such as water, oxygen, and salts because the pores in the coating are blocked by the zinc products of corrosion. This galvanic activity generally decreases with time due to:

1. the loss of electrical contact between zinc and steel as a result of corrosion of zinc particles and the formation of nonconductive corrosion products at the interface;
2. the loss of electrical contact between zinc particles as a result of the formation of corrosion products on the surface of the zinc particles themselves; or
3. blockage of the coating surface by zinc corrosion products.”

Considering this referenced extract, all three conditions are required to be simultaneously applied for cathodic protection to be stimulated. However, consider the following in terms of these three requirements:

1. “The zinc particles in the coating must be in electrical contact with each other.” This condition is most unlikely to occur as the majority of the zinc particles are separated by the paint matrix in order to maintain the cohesive “Barrier Protection” layer of the coating.
2. “The zinc particles must be in electrical contact with the steel.” As with condition 1, the paint matrix itself will tend to electrically insulate the majority of zinc

CHARACTERISTIC	ZINC RICH PAINT	HOT DIP GALVANIZED
<b>Barrier Protection</b>	Yes, but a function of quality and thickness of coating. Zinc corrosion products assist to maintain the barrier protection.	Yes, follows metallurgical laws, forms a ZnCO <sub>3</sub> patina as the barrier protection. (1st line of defence).
<b>Cathodic Protection</b>	Limited to 80 days or less and a function of the zinc particles within the DFT of the coating.	Yes, always available as long as zinc remains present. Only applicable if steel is exposed. (2nd Line of defence).
<b>Impervious Coating</b>	Yes, but dependent on painter skills, specification and coating thickness.	The metallurgical process ensures an impervious barrier independent of operator skills.
<b>Coating Thicknesses</b>	±20µm per application, up to 75µm with multiple applications. Dependent on the skill of the applicator.	The process produces a coating that ranges from 60µm to > 120µm dependent on steel thickness and chemistry. Achieved through a single dipping into molten zinc at 450°C.
<b>Adhesion to the Steel</b>	Mechanical bonding, which is a function of preparation in order to “key” the coating to the steel surface. Applying an inorganic coating when the RH is below 50%, without sufficient subsequent curing, can result in poor inter-coat adhesion of the topcoat.	Follows metallurgical laws (no curing) and is independent of operator skills. If the surface is not clean it will not galvanize. Easy to inspect.
<b>Estimated Service Life in a C4 Environment based on ISO 9223</b>	8 to 10 years to 1st maintenance, but dependent on the specification and quality of application.	20 to 40 years with an average of 30 years service life to 1st maintenance.
<b>Quality Control of the Application</b>	Numerous hold points and interim inspections for quality control.	2 hold points, one before galvanizing and one after galvanizing.
<b>Application and Process Controls</b>	A number of controls and environmental conditions must be in place before a coating application can be carried out.	Factory applied, independent of environmental conditions, but limited to process bath sizes.
<b>Limitations</b>	Not limited to size or site location, but limited by access to all steel surfaces.	Limited by component size, factory applied, but all surfaces are accessible.
<b>Continuity and Uniformity</b>	Dependent on the skill of the operator and generally thin at corners and sharp edges.	If the steel is not clean, such areas will show up as uncoated spots immediately after removal from the molten zinc.

Table 1: The differences between paint and hot dip galvanizing’s corrosion control of carbon steel

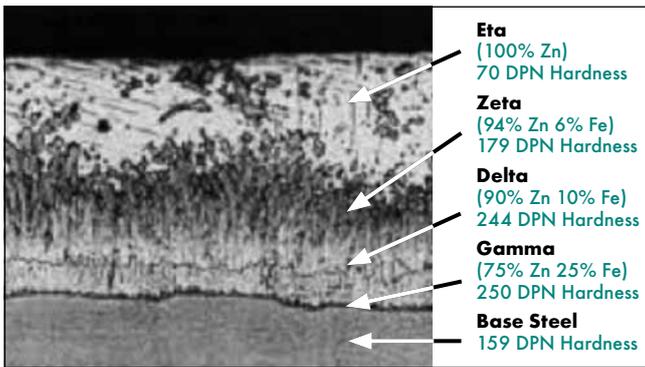


Figure 4: Micrograph of a typical hot dip galvanized coating. Coatings range from 60 to 120 microns plus. The metallurgical process of hot dip galvanizing follows the fundamental laws of physics, "if the steel is not perfectly cleaned, it will not galvanize".

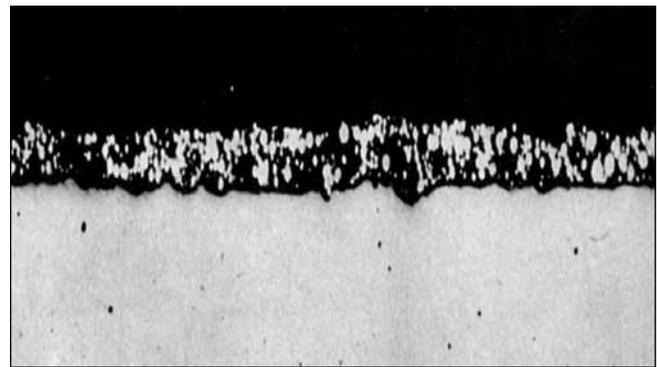


Figure 5: Micrograph of a typical zinc rich paint coating, applied by a skilled or semi-skilled operator. Coatings can range from 20 to 70 microns, but usually require multiple applications in order to build a suitable coating thickness, which again is dependent on the type of paint.

particles from the steel substrate.

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

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

The HDGASA propose that the degree of cathodic protection, with a sufficient quantity of zinc dust in the paint, can only be limited at best. As such, within a short

period of time, if cathodic protection was to be active, the individual zinc particles would corrode and thus insulate themselves. Thus cathodic protection would cease all together.

The value of the zinc rich paint is not so much that of cathodic protection, but rather that the Zinc particles at the outer surfaces of the paint coating, will form corrosion products (ZnO & ZnCO<sub>3</sub>) when exposed to the environment and thus assist to maintain and provide at best a longer life "barrier protection".

Turning to the characteristics of hot dip galvanizing, the coating consists of zinc and zinc / iron alloys that are metallurgically bonded to the steel. The electrical contact to the steel is guaranteed and at the same time the zinc is exposed to the environment. With hot dip galvanizing, cathodic protection is only activated should the steel is directly exposed, by some small chip or scratch in the coating or on a cut edge, to the environment.

Cathodic protection is characteristic referred to as Zinc's second line of defence. The first

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line of defence is not cathodic protection, but rather that of a barrier protection. A hot dip galvanized coating is impervious from the day it is produced. As described above, the “clean new” zinc will react with its environment to form three basic products of corrosion. Zinc must react or “corrode” and develop the stable ZnCO<sub>3</sub> layer (weathering). This layer constitutes the barrier protection or first line of defence against corrosion of carbon steel.

In essence hot dip galvanizing guarantees both barrier protection and long term cathodic protection for as long as metallic zinc and zinc iron alloys remain available. In order to illustrate the fundamental differences between the two forms of corrosion protection systems, we use the micrographic examples of the two coatings.

Hot dip galvanized coatings were first used approximately 170 years ago. In this time,

the basic technology has shown little or no significant changes. Hot dip galvanized steel over 100 years ago is fundamentally similar to hot dip galvanized steel today. The same metallurgical laws that applied then are the same laws that apply today. It is universally accepted that hot dip galvanizing has stood the test of time and has proven its natural ability to provide corrosion control in the majority of environmental conditions encountered throughout the globe both historically and in modern times. Zinc rich paints on the other hand, have been subjected to numerous “innovations” and changes aimed at improving performance.

There is no question that a suitably specified and applied zinc rich paint or epoxy coating will provide excellent corrosion control performance. However, as is the case with most paint coatings, the quality of the application is a significant factor in the determination of long term performance and service life of a particular paint system.

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

The differences between paint and hot dip galvanizing’s corrosion control of carbon steel are summarised in *Table 1*.

**Conclusion**

In conclusion, when comparing hot dip galvanizing to any form of zinc rich paint or epoxy, the characteristics of the two systems are certainly not equivalent in terms of corrosion control and specifically in terms of any claims to effective cathodic protection.

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

## Update on Intergalva 2018

The EGGA are hosting the event at the ESTREL HOTEL in Berlin (Germany) from the 17th to the 22nd of June 2018. Full details may be found at <https://www.intergalva.com/2018/>

Papers covering the following topics have been received and the successful speakers will be notified by November 2017:

- Market and product development – including coating durability; new applications in bridges, concrete reinforcement and other sectors; coating technology.
- Process technology – including plant design; kettle management/life; flux and degreasing technology; post-treatments; bath alloys.
- Environment and safety – including improvements in environmental performance; operational safety; material efficiency.
- Regulatory status – including regulatory issues affecting markets/ applications; future evolution of environmental controls on processes.
- Sustainable Development – galvanizing’s contribution to meeting

the goals of sustainable building and maintaining the value of infrastructure assets.

- Galvanizing in architecture – applications in building and construction.

Simultaneous translation is planned in English, German, Italian, Spanish, French, Polish, Japanese and Chinese languages.

Proposals received will be reviewed by the Papers Committee and accepted papers will now be notified by 1 November 2017.

**Workshops**

Interactive workshops will be held during Intergalva 2018 – to encourage discussion and information sharing on topics of most interest to delegates. Some of the workshops that are currently planned are:

- Improving zinc efficiency
- Floating dross – causes and avoidance
- Energy savings in galvanizing plants
- Zinc purchasing and price hedging on the LME



*Martin Kopf leads Europe’s general galvanizing industry towards Intergalva 2018.*

- Kettle management and optimising kettle life
- Waste acid disposal and regeneration
- Factors affecting choice of zinc melt composition and alloying
- Challenges of variable steel composition
- Flux technology, recycling and regeneration
- Pollution control and fume extraction
- Passivation and other post-treatments
- Improving your turnover with additional services
- Duplex coatings – painting and powder-coating of galvanized steel.



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**COATINGS & CHEMICALS**

## Level II Inspectors Course

Two Level II courses were held at the HDGASA offices in Bedfordview in March and May 2017 respectively.

The March course was attended by our newest HDGASA team member-Lara Teixeira and delegates from Certus Engineering, Tenova and The University of Johannesburg. In May 2017 Eskom, MHPSA, PIA Solar and ARMCO completed the Level II course. All candidates passed with four graduates achieving the Higher Grade level (>70%).



March 2017 Level II: (L- R) Lara Teixeira (HDGASA); Jarrod Drake(TENOVA), Mulaudzi Thabalo (UJ) and Alex Benassi (CERTUS ENG).



May 2017 Level II: (L- R) Kevin Tucker (PIA SOLAR); Innocent Bhengu (ESKOM), Duncan Ackerman (ARMCO) and Lando van Staden (MHPSA).

## Monoweld Galvanizers plant visit

A plant visit was arranged by Monoweld Galvanizers for the students of The SAISC School of Draughting at their facilities in Germiston. The students were hosted by MD Riaan Louw and given a first class tour of the galvanizing facilities, from the incoming steel yard to final inspection and despatch. The HDGASA provided booklets on the basics of Hot Dip Galvanizing as well as Design Wall Charts for these future Structural Steel Detailers to use to ensure designs are in line with SANS/ISO 14713.



Riaan Louw – MD of Monoweld Galvanizers hosted a plant tour in May 2017 for the SAISC School of Draughting at Monoweld’s Germiston plant.



## African Construction Expo 2017



African Construction Expo was held at Gallagher Estate in Midrand in May 2017. From indoor to outdoor experiences to workshops there was something for everyone at the African Construction Expo 2017.

The HDGASA was profiled on the Growing Up Africa (GUA) stand at the expo for 15 seconds, every 15 minutes for 2-days. More than 9 000 visitors attended which included architects, engineers, contractors, quantity surveyors, government representatives. Thank you GUA.



The event ended on a high note when Deborah Terhune of Growing Up Africa walked off with the coveted **LIFETIME ACHIEVEMENT AWARD** at the awards evening on the 24 May 2017. Congratulations and let's keep growing.

*“Knowledge is the only instrument of production that is not subject to diminishing returns”* John Maurice Clark

## **Level I: Introduction to Hot Dip Galvanizing**

The HDGASA one day INTRODUCTION TO HOT DIP GALVANIZING course is designed to provide an initial understanding of the concepts relating to hot dip galvanized coatings applied for corrosion control of steel components. The course comprises six modules. In order for the course to be viable we require six or more candidates to attend. Arrangements can also be made for this course to be held at a venue of your choosing for more than six candidates. In addition to the course, a special visit to a hot dip galvanizing plant may be arranged on a separate date, should six or more candidates be interested and able to attend.

## **Level II: Certified Galvanizing Inspectors**

The HDGASA advanced Level II course provides the necessary skills to assess the quality and conformance of Hot Dip Galvanized coatings and Duplex Systems to the applicable specification. Delegates are introduced to other metallic type coating specifications and their application for corrosion control design.

The course provides an in-depth interpretation of the specifications and accepted best practice procedures for determining coating thickness, visual inspection of surface finishes as well as the evaluation of these coatings for corrosion control of steel components. The course includes a visit to a hot dip galvanizing plant where delegates will have an opportunity to assess finished product against the relevant quality standards on a real time first hand basis.

Three Continuous Professional Development (CPD) points are awarded to delegates attending the entire course. Bookings are limited to a maximum of 10 people, with applications treated on a first-come-first-serve basis. In order for the course to be viable we require 6 or more candidates to attend. Arrangements can also be made for the course to be held at a venue of your choice for more than 6 candidates.

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# HOT DIP GALVANIZING AWARDS 2018

## CALL FOR SUBMISSIONS AND SPONSORS



The last HDGASA Awards, held at Thaba Eco Estate, in 2016 proved to be a stellar event with these premier awards sponsored, in main, by the Columbiana Boiler Company and the HDGASA. The Walter Barnett Trophy, went to the Advanced Galvanising team for the extraordinary Kirstenbosch Treetop Walkway, "The Boomslang". The 2018 Awards will be held at a prestigious Gauteng venue to be announced closer to the event.

### CATEGORIES

The categories in this event will remain unchanged for the 2018 awards. The categories are:

#### **Architectural**

All forms of architectural endeavour where hot dip galvanizing has been used to facilitate the structure in its corrosion protection or as an integral element of the aesthetics is welcomed. From sculptures to facades and integrated building elements, the use of hot dip galvanizing technology can be shown as a key component of the submission.

#### **Infrastructure**

This category focuses on the 'traditional' role of hot dip galvanizing – from mining infrastructure to bridges and towers using galvanized elements integrated into the structure or as stand-alone features, to the use of hot dip galvanizing in the road and transport arenas as well as at ports and harbours, airports and for reticulation of utilities and energy projects.

#### **Duplex**

The exceptional corrosion protection of duplex systems in any application to provide essential benefits to projects where challenging corrosion environments, legal requirements or pure aesthetics is used to the benefit of the client.

#### **Rejuvenation**

In these times, the rejuvenation of existing environments for repurposing or upgrading using hot dip galvanizing is highlighted. The re-establishment of a former historically significant structure or similar projects showing how hot dip galvanizing and/or duplex systems are integral to each project.

### SUBMISSIONS

Submissions are now open and there is no entry fee for submissions. Each submission must conform to a prescribed format and be accompanied by at least five (5) high resolution (>300 dpi) colour photographs of the entry. The submission format and T's & C's of the event may be downloaded from the Hot Dip Galvanizers Association website at [www.hdgasa.org.com](http://www.hdgasa.org.com).

### SPONSORSHIP

The event offers a superb opportunity for effective marketing as a sponsor. Sponsorships are available in three primary categories. *The Platinum Sponsor* is key to the event with a negotiated sponsorship opportunity delivering outstanding value. *Gold and Silver Sponsors* are also available with excellent marketing benefits. Additional sponsorships for specific elements of the event can also be discussed with our team.

**The challenge has been made and the champions will be rallied to once again compete for the laurels in the 2018 Hot Dip Galvanizing Awards.**

**THE QUESTION REMAINS... *do you have what it takes?***

# HDGASA 2017 Annual Golf Day

The HDGASA held its annual golf day on 25 May 2017 at Reading Country Club on a warm and sunny winter's day. The event was attended by more than 60 golf enthusiasts from all sectors of the galvanizing and steel sector. Phoenix Galvanizing travelled the long road to Gauteng from KZN to show the 'Vaalies' a thing or two about the game of golf. The course was in great condition thanks partly to the late rains a week earlier. The greens were exceptional and by most accounts on the fast side making the short game more challenging.

The golf day featured some fun activities of which the "Catapult Drive" was by far the most enjoyed. The Pink Lady continued to be a challenge with the majority of the field left wondering where she had gone to. With 'refreshments' at several holes throughout the course, the competitors were never in fear of being without a dram or two to steady their nerves. The halfway house was a welcome break with a meal and refreshment sponsored by Lianru Galvanizing.



Overall 2017 winners – Adrian Louw, Dawid Oosthuizen, Steve and Thorne Van Zyl.

The day ended with a delicious carvery and refreshments followed by the prize giving. Dwayne Rockwell kept the show alive with his witty repartee and great music until the last golfer had left for home. Robin Clarke, Executive Director of HDGASA, thanked the sponsors for their support and Lara Teixeira

for a well planned and executed event. The prize giving followed with:

**1st Prize** going to Adrian Louw, Dawid Oosthuizen, Steve and Thorne Van Zyl for the second year in a row (97).

**2nd Prize** was taken by Kevin Smith, Darryl



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Bailie, Barend & Jacques Kok (94).

**Third place winners** were Sydney Venter, Steve Endeley, Edzard Verseput and Willie Loubser (89).

The **Pink Lady** was brought home in style by Kevin Smith, Darryl Bailie, Barend & Jacques Kok (46).

**Nearest the Pin** on the day was at the 5th – G Van Lillie and at the 11th – Cameron Taylor with the aid of a giant catapult.

The **Longest Drive** was by Duncan Ackerman

With the **Longest Day** awarded to Jonathan vd Merwe, Jannie vd Berg and Shaun Grey (34).

The Association thanks the following sponsors for their support and all who participated in making this an event to be remembered:

Pink Lady as well as the 10th & 18th Holes : **Transvaal Galvanizers**

Hole 1: **Phoenix Galvanizers**

Hole 9: **Krome Metal Chemicals**

Hole 17: **SA Galvanizing Services (SAGS) Metsep** for bottled water and gifts at the first hole.

**Lianru Galvanizers** for the 'Halfway House' meal and refreshment vouchers.

**The Pro Shop**, Wendywood, for the putters in the first prize bundle.

**We look forward to seeing you all at our next golf day in 2018.**



*Golf drive for show...*



*Golf putt for dough...*



*The golf catapult drive at the 11th hole.*



*2nd place – Kevin Smith, Darryl Bailie, Barend & Jacques Kok.*



*3rd place – Sydney Venter, Steve Endeley, Edzard Verseput and Willie Loubser.*



*The Longest Day – went to the team of Jonathan vd Merwe, Jannie vd Berg & Shaun Grey*



*The Longest Drive – Duncan Ackerman.*



*Nearest the Pin at the 11th hole – Cameron Taylor.*



*Nearest the Pin at the 5th hole – G Van Lillie.*





# Personality Profile

## ROBERT WATCHORN

**How did you get involved in recycling of acid waste?**

My focus was not initially waste or even chemicals, however when my father in law retired from the company after 40 odd years, I just happened to be looking for a change. Came for the interview, liked what I saw and have been here for the past 17 years.

**Tell us a little about yourself, your home life, your hobbies and passions**

I am 47 at the moment, I have been married to my wife for 21 years and have a daughter of 19 and a son of 18.

I love to travel, I am interested in seeing new places, and I love the history and traditions of the countries I visit. I would say that Egypt has been the most all round "grandest" trip that I have ever embarked on.

**What professional achievement are you most proud of?**

I think the proudest moment was when I was made Managing Director, being given that responsibility was a real feather in my cap.

**What are your thoughts on the 'greening' of chemical processes in SA?**

Being employed in the recycling industry, it is obviously foremost on my mind from a business point of view. I do also feel that tighter control must be enforced for all chemical producers at source. I fear that the true impact of our actions have not yet been quantified.

**Who has had the biggest influence in your life?**

I was sort of at a loose end before I joined Metsep, and Dave Whelan took me under his wing and showed me the ropes, the fact that he has now allowed me to basically run the business on his behalf is a true sign that I have grown in my ability and confidence and I am forever grateful to him for that.

**What is your philosophy of life?**

Live each day to the fullest, there is truly no time like the present – get it done, move on, don't look back.

**What is your favourite reading?**

Anything by Wilbur Smith or Stephen King. I particularly liked the Egyptian series by Wilbur Smith. Stephen King is just such an original writer, never a dull moment.

**Do you have any dislikes?**

Raw onions

**Complete the sentence: Five o'clock on a Friday, you...**

Switch off the phone, fire up the braai and hopefully have a family dinner – if the kids decide to grace us with their presence.

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# HOW GOOD ARE YOUR COMMUNICATION SKILLS

Based on a web article "The Importance of Effective Communication " by Marybeth Miceli

More often than not, the importance of clear concise communication is overlooked by the typical technical specialist. We become an expert in our field and then wonder why we are undervalued by the peers in other disciplines of engineering, not to mention our non-engineering clients and investors. I contend that we are undervalued because of our widespread inability to explain what we do clearly and concisely.

It is one of the hardest goals to accomplish, to be able to boil down difficult concepts into a short and easily understood description of your technology, products or services. You have to

know your subject matter inside and out to be able to explain it simply. You might ask, why this is even important – 'my colleagues understand me.' As technical specialists, we know that technology doesn't just happen. We need funding that comes from other non-related engineering disciplines or clients with no specialized technical background at all. We need our customers to understand the importance of various technologically related issues in order to produce the product they expect.

As communications become more instantaneous through the proliferation of social media, concise, effective, conveyance of

ideas has become increasingly important. Will technical/engineering ideas be transmitted over Twitter in 140 characters? Not likely. But in an ever-speeding-up world, getting that simple point through to your client will only get more difficult if you are not concise, clear and specific. It is a fact of life that in the 21st century the honing of your communication skills has become increasingly important, not only for your own business, but also for growth as a professional and the promotion of the industry through which you provide services and products.



**IF YOU CAN'T EXPLAIN IT SIMPLY, YOU DON'T UNDERSTAND IT WELL ENOUGH!**

# Hot dip Galvanizing Members

GALVANIZER	LOCATION	TEL. NO	SPIN	NO. OF LINES	BATH SIZES (L x W x D) (m)
<b>GAUTENG</b>					
ArcelorMittal South Africa	Vanderbijlpark	016 889 9111		3	Sheet galvanizer
Armco Galvanizers	Isando	011 974 8511		1	13.2 x 1.5 x 2.2
Armco Galvanizers - Randfontein	Randfontein	011 693 5825		1	6.5 x 1.3 x 2.0
Babcock Ntuthuko Powerlines (Pty) Ltd	Nigel	011 739 8200		1	12.0 x 1.4 x 1.8
Galferro Galvanisers	Springs	011 817 3667		4	13.5 x 1.65 x 2.5
In-line and general					6.8 x 0.9 x 1.4 6.5 x 0.9 x 1.5 6.45 x 0.755 x 0.9
Lianru Galvanisers cc	Nigel	011 814 8658		2	7.2 x 1.3 x 1.6 4.5 x 1.3 x 1.6
Monoweld Galvanizers	Germiston	011 876 2900		3	14.0 x 1.35 x 2.5 10.0 x 2.0 x 4.0
Pro-Tech Galvanizers (Pty) Ltd	Nigel	011 814 4292	•	2	Dia 42mm to 114mm max tube length 6.7m 3.2 x 1.1 x 1.5 3.0 x 1.1 x 1.2
Robor Tube	Elandsfontein	011 971 1600		1	Tube & Pipe Galvanizer
Silverton Engineering	Silverton	012 843 8000		1	7.0 x 1.7 x 2.0
SMT Galvanizers	Benoni South	011 421 1495	•	2	2.6 x 1.0 x 1.5 2.0 x 1.0 x 1.5
Transvaal Galvanisers	Nigel	011 814 1113		4	15.5 x 2.0 x 3.2 – 1 of 12.5 x 1.2 x 1.8 – 1 of 8.0 x 1.2 x 1.5 – 2 of
In-line and general					
<b>WESTERN CAPE</b>					
Advanced Galvanising (Pty) Ltd	Bellville	021 951 6242		1	14.0 x 1.4 x 3.0
Helderberg Galvanizing	Strand	021 845 4500		1	5.5 x 0.8 x 2.4
South Cape Galvanizing (Pty) Ltd (NB: big line is not in operation)	George Industria	044 884 0882		2	3.7 x 0.94 x 2.3 (5.5 x 1.0 x 2.6)
<b>EASTERN CAPE</b>					
Galvanising Techniques cc	Port Elizabeth	041 486 1432		1	12.0 x 1.3 x 2.3
Morhot (Pty) Ltd	East London	043 763 1143		1	7.0 x 2.5 x 1.5
<b>KWAZULU/NATAL</b>					
A&A Galvanisers	Pietermaritzburg	033 387 5783	•	1	3.8 x 0.9 x 1.8
Bay Galvanisers	Richards Bay	035 751 1942		1	5.0 x 1.2 x 2.5
Durban Galvanizing (Pty) Ltd	Briardene	031 563 7032		1	9.5 x 1.3 x 3.0
Phoenix Galvanizing (Pty) Ltd	Phoenix	031 500 1607	•	2	14.0 x 1.4 x 2.5 3.0 x 1.2 x 1.2
Pinetown Galvanizing	Pinetown	031 700 5599		1	9.0 x 1.2 x 3.0
Voigt & Willecke (Pty) Ltd	Durban	031 902 2248		1	14.0 x 1.3 x 2.5
<b>INTERNATIONAL</b>					
<b>MAURITIUS</b>					
Galvanising Co Ltd	Port Louis	+230 234 5118		1	7.0 x 0.75 x 1.68
<b>ZIMBABWE</b>					
Essar Tubes	Graniteside	+263772833477		1	10.0 x 1.1 x 1.0

- Sheet, wire, pipe and other in-line galvanizing members dedicate their plants to the galvanizing of their own products. The bath sizes are inside dimensions and not maximum component size. Kindly take note of the expansion of the component when dipped into molten zinc or discuss with relevant galvanizer.

# HOT DIP GALVANIZING... THE **BEST PROTECTION!**

## GALVANIZING BATH SIZES

ISANDO



13m x 1,45m x 2m  
(length x width x depth)

RANDFONTEIN



6m x 1,45m x 1,6m  
(length x width x depth)

## CONSISTENTLY DELIVERING SUPERIOR QUALITY GALVANIZED PRODUCTS TO ALL OUR CUSTOMERS

**Armco Galvanizers Isando** has been operating since 1989. Geared up to accommodate heavy structural steel up and till 13m in length. Isando has an average output of plus minus 2000 tons per month. With an improved lay down area and increased loading capacity by addition of a tower crane we strive to give "A" class service to all our customers big or small.

**Armco Galvanizers Randfontein** is our second facility based in the Randfontein area. Randfontein has an average output of plus minus 800 tons per month and is geared up to handle light to medium structural steel up and till 6m in length.

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

Isando | Tel. +27 11 974 8511

Randfontein | Tel. +27 11 693 5825

Web. [www.armco.co.za](http://www.armco.co.za)

