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Hot Dip Galvanizers Association Southern Africa 2016 Volume 13 Issue 3

2016 Hot Dip Galvanizing AWARDS

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Executive Director's Comment

It is common knowledge that the past few years have been tough for the steel industry. The contraction in expenditure on substantial local infrastructure and mining projects in particular has challenged the industry. Hot dip galvanizers within the Southern African region as well as our associate and affiliated partners have not been immune to this contraction.

We have however seen a shift in the landscape. Further opportunities are developing in parallel with traditional applications of hot dip galvanizing. New markets are arising in areas such as in the rejuvenation of existing infrastructure. Also the increase in the use of steel not only as the primary medium of construction but also as material for achieving decorative and aesthetic features is gaining traction. The advent of solar parks and other renewable energy developments is being seen as the 'new' industrial revolution. Many medium and small enterprises, renowned for adaptability and resilience, in South Africa have chosen to embrace these new opportunities. By embracing these new applications and markets, opportunities for learning and development exists.

The awards submissions clearly demonstrated the level of innovation, engineering excellence and project management which we are capable of achieving. An exciting aspect in many of the awards submissions were the comments about team work and integration of design team efforts; fabrication skills, hot dip galvanizing and duplexing process controls, which were shared from project inception. This resulted in the delivery of excellent "finished products" as showcased by the projects on display in this edition.

A heartfelt thanks to the team at the Association who collected, collated and presented these projects to the judges. A big thank you also to the judges who gave freely of their time and who had the unenviable task of dissecting excellence to determine category and overall winners.

Very importantly, thanks to the entrants. The submissions of projects for the awards provides the Association with an opportunity to showcase excellence in our industry. This translates into opportunities for the marketing of hot dip galvanizing to designers, architects, engineers and fabricators and to sensitize these decision makers of the wide variety of applications for hot dip galvanizing and duplex coatings.

I am confident that our members and their business partners will continue to participate enthusiastically in this initiative to showcase and grow our industry. Congratulations to all our participants and well done to the winners.

Hot Dip Galvanizing Today places on record and celebrates all the projects, their challenges, solutions and the teamwork that delivered excellent results.

Robin Clarke

2016 Hot Dip Galvanizing AWARDS

The Walter Barnett Award: *An award for excellence*

Walter G S Barnett was actively involved in the Southern African Hot Dip Galvanizing industry for more than 40 years. In 1965 Walter was a founding member of the Hot Dip Galvanizers Association Southern Africa. His concept of a galvanizers association sought to drive improvement of the industry regarding quality of product, dissemination of technical knowhow and as a professional service to the wider corrosion industry. He was appointed as the inaugural Executive Director of the Hot Dip Galvanizers Association Southern Africa.

Walter was highly regarded as a corrosion consultant specialising in numerous forms of corrosion control. Walter was closely involved with the Corrosion Institute of Southern Africa, where as a Past President and honorary Life Member he played a leading role in the development and awareness of the destructive nature that corrosion has on steel structures. In 1988 he received the Institute's Gold Medal award in recognition of meritorious service to the corrosion industry and the advancement of corrosion science and technology. He was instrumental in the introduction of hot dip galvanized steel and duplex systems into the mining industry Walter authored numerous technical papers on galvanizing and corrosion control systems published both in South Africa and internationally.

Walter's reputation was not confined to the Southern African region; he was also highly regarded and recognized internationally. At the 2002 European General Galvanizers Association meeting in Porto, Portugal, Walter was presented with the European galvanizer's award in recognition of his contributions to the industry. He remained active almost up until the day of his passing. Walter's name will lives on in our industry as an icon not only of Hot Dip Galvanizing but also of the broader corrosion control industry.

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

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Architectural Category Entries

The Nelson Mandela Metropolitan University's South Campus Student Housing

Location: Nelson Mandela Metropolitan University South Campus

Project Team:

Client: NMMU Infrastructure Projects

Architect: The Matrix...cc Urban Designers and Architects

Engineer – Structural: Aurecon South Africa (Pty) Ltd / Len Beattie and Associates

Main Contractor: NMC Construction

Steel Contractor: Rizel Engineering / B&D Engineering

Hot Dip Galvanizer: Galvanizing Techniques

The Nelson Mandela Metropolitan University's South Campus Living and Learning Student Housing architectural brief called for the design new residences veiled behind the existing Sanlam Student Village, along the main arterial road. The brief required the inclusion of associated facilities, for 310 post-graduate students over and above the residence itself, in order to create a "Living and Learning" environment. This marks a significant shift from the current dormitory type arrangement present on campus. The project scope required a design that provides for semi self-catering apartments and associated support facilities for the students.

In order to ensure variety, the design included an arrangement that resulted in two different building forms. The first building incorporates four-bedroom apartments arranged along open corridors in a long, narrow four-storey building capped with mono-pitched roofs. At the east end of each corridor facilities such as a communal study room, lounge and laundry were provided.

The second three storey building provided two-bedroom units interspersed between the four-bed apartment buildings. In these the common areas such as a study room, lounge and laundry were located on the ground floor. The buildings are attractively finished using lightly textured white self-coloured plaster as the primary finish.

A vast amount of hot dip galvanized steel was used throughout the project from structural columns to balustrades, staircases, bridges, balconies and pergolas. The patina of the natural hot dip galvanized surface finish is aesthetically noticeable contrasting with the light coloured wall finish of the buildings.

The architectural decision to use galvanized steel in this project shows an appreciation of, not only the best selection of corrosion control for an optimal service life, but also for a finish that provides pleasing soft grey tones contrasting with lighter elements.

The Nelson Mandela Metropolitan University's South Campus Student Housing.

The Nelson Mandela Metropolitan University: Vista Campus – BEd Foundation Phase Building

Location: Vista University Campus, Missionvale, Port Elizabeth

Project Team:

Developer / Owner / End User: Nelson Mandela Metropolitan University (NMMU)

Architect: The Matrix...cc Urban Designers and Architects

Specifier / Project Team: The Matrix...cc Urban Designers and Architects. Prof. Albrecht Herholdt, Gianni Geminiani, Neal Fisher

Structural / Civil Engineer: Sigma Consulting Civil & Structural Engineers – Hannes Loots

Electrical / Mechanical Engineers: CARIFRO – Timothy de Vos, David Frost, Peter Gatang'i

Project Manager: Aproma – Marco Angermeier

Main Contractor: WBHO

Hot Dip Galvanizer: Galvanising Techniques

Steel Sub-Contractor: NKS Steel Construction cc

In 2013, the Nelson Mandela Metropolitan University adopted a resolution requiring that all new university building designs must be selected from entries submitted through a prequalification architectural competition for each project.

The Matrix...cc Urban Design Architects' winning design secured the contract for the B. Ed. Foundation-Phase building at the Vista Campus in Missionvale. The design proposed an architecturally playful building which would restore the connection with the local community. This was achieved by establishing an open public square as the predominant feature of the design. Together with integrating the new buildings within the greater campus and surrounding environment this connection was secured.

The design brief also called for the inclusion of colourful local art and publicly displayed sculptures. This was achieved by using of colourful mosaic tiles placed in prominent areas, such as the 'floating box' discussion

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The Nelson Mandela Metropolitan University: Vista Campus – BEd Foundation Phase Building.

pit a feature enticing communication within the precinct.

In establishing the spatial massing of the proposed site the design reinforced the creation of a compelling pedestrian entrance drawing traffic into the heart of the Missionvale campus. This was emphasised by the spire of the main administration building accentuating the axial link between the square and the campus.

The creation of a new campus gateway resulted in the buildings having to be separated in to two structures. The 'Classroom Building', consists of a central atrium and gallery linking three levels of the training facilities, lecture rooms and computer facilities. The 'Office Building' hosts the administration, security and staff facilities.

A grand entrance canopy, defining the gateway threshold layers the transition between public spaces, linking the two buildings visually and spatially. The canopy also provides shelter to a series of concrete ramp bridges that connect the different levels between the buildings.

Concrete columns, used as base connections, tie back to the all hot dip galvanized steel beams, supporting the surrounding concrete a theme repeated throughout the design.

Where horizontal hot dip galvanized steel beams connect to vertical concrete off-shutter columns, an elegant footplate on the base of the galvanized steel I-beam sits lightly on the concrete corbel support.

The detailed use of hot dip galvanized steel has been carried through into elements such as the framework surrounds into which the flush glazing has been installed, in the lift shaft, to form glass façades to both front and rear. Again illustrating the versatility of hot dip galvanized steel aesthetically finished to the required architectural quality finish required.

The mezzanine floor above the Call Centre promotes the industrial aesthetic of the building by exposing the ducting that forms part of the air conditioning and smoke extraction system. The Environmental Engineer specified the use of a solar shading device on the North Side of the Main Building which was constructed of numerous hot dip galvanized steel fittings and located to provide respite from the sun for the building during day light hours.

The project employs the latest technologies and environmental systems to construct this 'New Age' building. The building also demonstrates the use of how hot dip galvanized steel has been employed as an architectural material that participates in the aesthetics and integrates into a well-proportioned building.

The New Tram Street Offices, Pretoria

Location:
273 Tram Street, Nieuw Muckleneuk, Pretoria

Project Team:
Client: Duncharl Investment (Pty) Ltd.
Architect: Jeremie Malan Architects cc
Civil Engineer: Otec
Structural Engineer: Otec
Contractor: JC Van Der Linde Venter Projects

The new Tram Street project entails a four level commercial office block in Nieuw Muckleneuk, Pretoria .This area is rapidly expanding with many new developments underway.

The building provides a floor space of around twelve hundred square meters on a property of twelve hundred and seventy six square meters and so adds to the densification of the precinct. Construction commenced in September 2013 and ended in August 2014. Once completed all of the office space was let and is currently fully occupied.

Achieving maximum rentable building area on a small site, was a major design challenge. The design solution achieved a compact plan form with a vertical extension up to the limit of height restrictions. The main building office areas are elevated off

The New Tram Street Offices, Pretoria.

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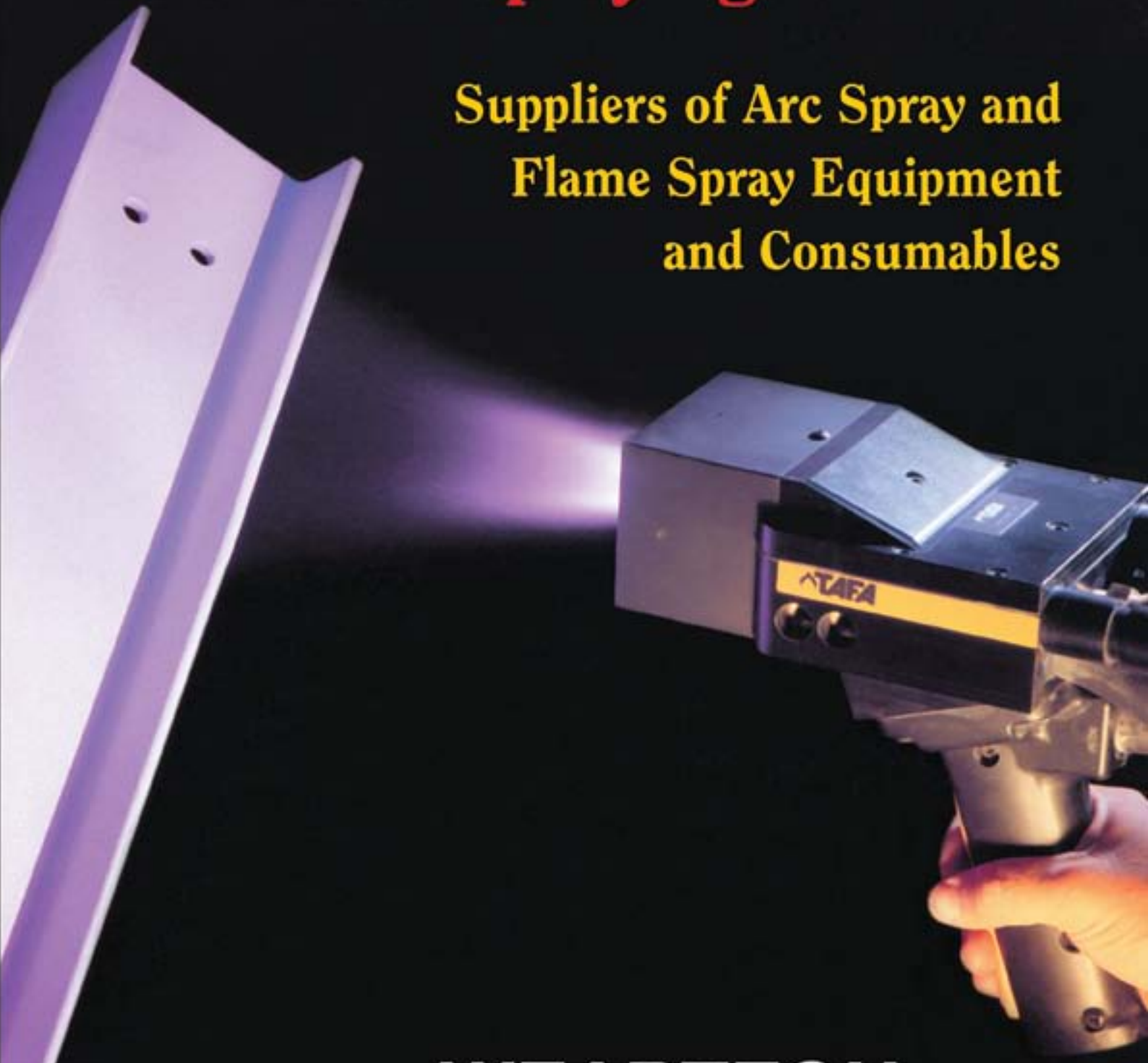

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Example of an outstanding feature is the vertical elevations that emphasize a glazed staircase and concrete lift shaft which forms the services core of the building. Office space is accommodated on either side of the central core and configured to allow tenant flexibility. The vertical core effectively links the ground floor parking level with three storeys of offices and the roof space above. Tenants have access to the roof space. This forms an ideal area for relaxation and informal office functions.

Each floor has office space on either side of the central core and can be configured to allow for tenant flexibility. Office areas per floor can be arranged to function separately or as a unit. The basic open plan office areas received internal layouts in dry walling to suit tenant requirements.

The height of the building allows for spectacular views from the higher floors, especially the accessible roof space. Strip windows stretching from column to column provide panoramic views of the surrounding landscape with its Jacaranda lined streets. Because space for soft landscaping on ground level is limited, custom designed irrigated planter boxes were spaced over the north and south elevations. These hot dip galvanized planters, coupled to hot dip galvanized drain pipes integrate well with the softer textures of green foliage, yet provide an interesting contrast to the clean and modern aesthetics of the building.

Hot dip galvanized steel has been used for the sun control structure on the northern and southern facades of the building. Hot dip galvanized structural steel was specified for the construction of the entrance canopy of the office block. The entrance canopy roof is framed with a horizontal hot dip galvanized steel channel supported from the building, given the illusion of a floating roof. This meticulous attention to detail contrasts the mass of the building to the lightweight structure of the cantilevered steel, emphasizing the entrance to the user.

The project is unique in the way that galvanized steel is used to improve the architectural environmental impact as a modular building element in a soft suburban node. Hot dip galvanized steel, due to its unique properties, is utilized as a key building material to bind other materials, i.e. concrete, brick, steel sheeting and glass, into a coherent whole.

The Last Glass House, Parktown North

Location: Parktown West, Johannesburg

Project Team:

Developer / Owner / Client: Roelof Petrus van Wyk

Architect: Thomashoff + Partners

Main Contractor: Paragon Property Developments (Pty) Ltd

Structural Engineer: P Design cc Civil & Structural Engineers

Steel Contractor: Cadcon (Pty) Ltd

Hot Dip Galvanizer: Monoweld Galvanizers

"The Last Glass House" is situated on the rocky outcrop on the Westcliffe Ridge, with a view over the valley to the west, with Auckland Park and Melville in the background.

Designed by architect Karlien Thomashoff together with artist/owner Roelof Petrus van Wyk, the design involves a creative interpretation of the industrial architecture and materials that permeate the gold mining history of Johannesburg.

The brief was a residential dwelling for an owner/artist that includes bedroom and on-suite bathroom, kitchen, dining, lounge, study areas, and a guest room facility. Ancillary facilities include a swimming pool, staff quarters and storage requirements.

The design was inspired by the rich history of Johannesburg reflecting the goldmines and surrounding industrial areas. The essential functionality of the industrial buildings in central Johannesburg represented a key characteristic including the use of mass-manufactured steel fenestration. Further motivational inspiration was to reflect the hot dip galvanized steel electricity pylons located a few metres away from the site in a municipal servitude.

The site falls approximately 6 metres from East to West. The project was conceptualised as a series of interrelated spaces, defined by elements such as retaining walls, the horizontal planes of the terraces, and glass walls. Significant spaces contain major landscape elements, such as a massive century old oak tree, the pool, a landscaped mass of natural grass, and a landscaped earth berm. These create a series of spaces or outdoor rooms integral to the landscape with various degrees of privacy. The top terrace becomes a threshold space, with pedestrian and vehicle entrance and parking area. The main structure is situated on the intermediate terrace, a semi-private external space that contains the swimming pool and entertainment area. The bottom terrace to the West is the most private - the double volume bedroom suite that opens onto the garden under the old oak tree.

The residential structure is 5m wide and 42m long, consisting of a single open plan space, that contains most of the required functional areas. Hierarchies of privacy are obtained through vertical separation, by the use of a split-level configuration. To the north and south of the main structure, the guest room facilities and staff quarters are accommodated in re-purposed industrial shipping containers.

Hot dip galvanized steel was employed as the preferred material of construction as both aesthetics and a maintenance free 35 year service life became an essential ingredient given the indigenous environmental theme.

The Last Glass House, Parktown North.

Infrastructure Category Entries

Mogalakwena Dewatering Project

Location: Mokopane, Waterberg District Municipality, Limpopo

Project Team:

Client: Anglo Platinum

Specifiers: Paterson and Cooke (Designed and Installed)

Contractor: Macsteel Tube and Pipe Reticulation Group

Other: Tyco Shurjoint

Hot Dip Galvanizer: Monoweld Galvanizing

Mogalakwena is an Anglo Platinum Open pit Mine in Mokopane, Limpopo. The project was initiated after the local council advised that it would stop providing water to the mine due to water supply shortages. A dewatering system, utilizing water that is collected from natural rain run-off and from various mining operations in six disused pits would replace the council's water supply.

Macsteel Tube and Pipe offered a water reticulation solution for this project using a ring-end coupling solution as opposed to the conventional flanged or grooved couplings. The simple fabrication technique uses a ring welded to both ends of the pipe. This facilitated easy location of the pipes during installation of the pipeline . Local labour was trained to install the pipes and couplings.

The pipeline and components were manufactured to SANS 719 grade C and galvanized to SANS 121 / ISO 1461. The performance standards meet or exceed the requirements of ASTM F1476 and AWWA C 606. The pipeline was designed to take a pressure of 24 to 36 bars. The minimum galvanized coating thickness of 100 microns was specified by the consultants on the project. A project specific Quality Control Procedure was put in place before the manufacturing started. Regular inspection reports were compiled for the project and approved by an independent third party inspectorate.

Over thirty two kilometres of 450mm nominal bore hot dip galvanized piping with two thousand seven hundred galvanized couplings being successfully supplied and installed.

This was the first time that the 'Shurjoint' coupling was used in South Africa. The major benefit of this cost effective solution was the speed of fabrication and installation.

The dewatering project allows the mine to continue to operate without affecting supply of water to the local community. Furthermore the mine water is recycled to reduce dependence on the local water resources. The hot dip galvanizing offers an environmentally friendly solution for the design life of the mine. It is a great example of Government and private partnership achieving a common solution.

It is the first time that this ring-end joint has been used in South Africa and the project ensures successful uses of scarce resources. It is a project that combines the technical requirement and fulfils requirement of both the local community and business.

Mogalakwena Dewatering Project.

Port of Richards Bay Floating Breakwater Berth 208

Location: Richards Bay Harbour

Project Team:
Client: Transnet National Ports Authority
Designer: WSP Africa Coastal Engineers
Specifier: Transnet Capital Projects
Main Contractor: Stefanutti Stocks
Hot Dip Galvanizer: Bay Galvanizers

Port of Richards Bay Floating Breakwater Berth 208.

Berth 208, is a new bulk liquid berth, in the Port of Richards Bay. This berth shares the border with the eChwebeni Natural Heritage site, a significant conservation area with a highly sensitive mangrove forest.

The Environmental Impact Assessment study undertaken for Berth 208 identified the potential impact of increased shoreline erosion for the site. It also identified the equally important challenge of deposition of sand by high tidal waters immediately landward of the eroded zone along the shoreline. These impacts together with shoreline erosion posed a major threat to the mangrove ecosystem, the animals and plants that inhabit this area within the Port of Richards Bay.

The solution was to construct a floating breakwater spanning six hundred and sixty meters and consisting of forty four square section floating concrete pontoons. These pontoons are placed along Berth 208 to prevent further erosion caused by the wave action of arriving and departing ships.

A risk was identified in that the pontoons being anchored in a high traffic area are susceptible to structural damage resulting from collisions with marine vessels.

To address the foregoing concern and to ensure an acceptable low maintenance and high service life of the floating breakwater, the rebar cast into the concrete pontoon was specified to be hot dip galvanized.

The hot dip galvanized steel is better suited to deal with the environment and prevent excessive spalling of the concrete pontoons. As the concrete hardens a coating of stable, insoluble, zincates is generated. This, together with, the approximately seventy five to eighty five microns of zinc and zinc iron alloys provides corrosion protection as both a barrier and a cathodic protection mechanism.

Hot dip galvanizing of the steel rebar, while not being a replacement for poor concrete quality, was an economical and cost effective solution. It is expected a low frequency maintenance will be required and that up to three to four times the normal service life will be achieved; relative to similar pontoons in which non-galvanized rebar would have been used.

Chimp Eden Chimpanzee Enclosures.

Chimp Eden Chimpanzee Enclosures

Location: Nelspruit

Project Team:
Client: Jane Goodall Institute
Developer / Owner: Jane Goodall Institute
Main Contractor: Danedie
Hot Dip Galvanizer: Armco Galvanizers

In 2012 an American student was attacked by two chimpanzees at a sanctuary in Nelspruit.

The initial reaction to the attack was to have the animals euthanized, but Jane Goodall was able to garner public support and raise R1.8m to build specialized enclosures to house the animals.

The cages required a specialized design to meet certain criteria. Amongst others, the cages needed to prevent any harm coming to the animals, yet withstand high levels of abuse. The enclosures needed to be maintenance free and provide a long service life.

Hot dip galvanizing was chosen as the corrosion control mechanism to ensure low maintenance and provide a long service life. It was recognized that the hard wearing zinc carbonate coating which develops from the hot dip coating would form an excellent barrier against corrosion.

Since the project was an international collaboration by conservation groups, these enclosures have raised the profile of such designs, inclusive of hot dip galvanizing, into non-traditional galvanizing communities, both locally and abroad.

The Kathu Solar Park

Location: Kathu, Northern Cape

Project Team:

Project Manager: Ercam SA (Pty) Ltd

Main Contractor: JV Sener, Acciona & WBHO

Transporter: Van Wyk Transport

Hot Dip Galvanizer: Advance Galvanizing

The Kathu Solar Photovoltaic Park has been described as one of the largest single-axis tracking technology solar plants worldwide.

The project is one of twenty eight renewable energy projects under the ESKOM and Department of Energy's Independent Power Producers procurement programme implementation agreement. A six billion rand investment in the establishment of renewable energy facilities throughout South Africa is forecast. This critical initiative is a crucial part of meeting our country's need for additional electrical energy needed to preserve and drive our economy.

The Kathu Solar Park.

The Kathu Solar Park is capable of producing a hundred megawatts through a patented parabolic trough system designed by solar engineering and construction specialists SENER. The system is integrated with a thermal-salts energy storage technology capable of providing for four and a half hour storage capacity.

In consideration of the issues related to service life, hot dip galvanizing of all steelwork was specified by ACCONIA, the

The Uzizi Bridges Project – Tugela Ferry, KZN.

renewable energy independent power provider.

Around three thousand six hundred tons of steel was hot dip galvanized in close cooperation between galvanizer and fabricator.

Through professional liaison and coordinated design efforts that provided for sufficient venting and drainage of the structures during galvanizing as well as methods of handling the structure thus assuring good rates of production with fast turnaround times. This resulted in excellent quality galvanizing being delivered to site. Scheduled inspections and sign-off's by representatives of the Hot Dip Galvanizers Association ensured that independent quality control of the hot dip galvanized finish was assured throughout the project.

Aside from the technical achievements, the Kathu Solar Park has been heralded as a breath of fresh air for the local community. With around twelve hundred jobs created during the construction phase the community is expected to undergo further local economic development through the engagement of services from local entrepreneurs. Direct benefits will be the electrification of an estimated eighty thousand homes in the region.

The Uzizi Bridges Project – Tugela Ferry, KZN

Location: Tugela River – Tugela Ferry District in the Uzzi Ward

Project Team:
Developer: Nonkhoo & Associates
Designer: GDB Engineers
Specifier: Geoff Boutell
Project Manager: Prassi Nankhoo
Main Contractor: Ingoyama Nicon
Hot Dip Galvanizer: Bay Galvanizers

Historically bridges of all descriptions have played pivotal roles in the development of local communities, ultimately advancing civilization to the far flung regions of the globe. The Uzizi Pedestrian Bridge Project over the Tugela River is certainly no different and has become a prime contributor to improving the lives of local inhabitants in the region.

The Tugela River flows throughout the year and is prone to flooding during the rainy season this leads to rural areas being cut off from services and facilities like schools, hospitals trading stores and other groups of people. Without a bridge the rural communities are forced to attempt unsafe river crossings or to take arduous time consuming detours to access these crucial services.

Initiatives on the part of the authorities, together with the regions communities, identified the desperate need to construct suitable and safe river crossings. This initiative has seen the construction of the series of Uzizi pedestrian bridges, now benefitting the local communities.

The benefits of hot dip galvanized steel ensured that it was specified as the material of choice for the construction of the Uzizi bridges.

These benefits included:

- The cost and economic value of hot dip galvanized steel, given the site location and non-availability of local materials and equipment for fabrication and maintenance.
- The versatility of hot dip galvanized steel fabrication together with hot dip galvanizing's proven and effective corrosion control in rural environments.
- The capacity to withstand rough handling during loading, transportation and offloading at such an isolated site could not be matched by any alternative corrosion control coatings.

The project was completed to the satisfaction of the client and a grateful local community. Without paying a premium, the client has a visually striking and durable bridge that reflects positively on the local municipality and community. The community has a structure that allows safe passage to essential services for themselves and their children. Although a relatively small project, it represents a positive and rewarding return on the investment and a major contribution to service delivery in the spirit of people first or 'batho pele'.

Duplex Category Entries

Beth Armstrong's UN Millenium Goals Flag Pole Sculpture

Location:
Oostvoorne, Netherlands

Project Team:
Developer / Owner: Beth Diane Armstrong
Duplexing Contractor: Bulldog Projects
Hot Dip Galvanizer: Monoweld Galvanizers (Previously Robor Galvanizers)

Beth Armstrong has a Masters in Fine Art from Rhodes University and works as a steel being her preferred medium.

The Kern Kunst Westvoorne Foundation in the Netherlands commissioned three permanent artworks by South African artists that were to be permanently displayed in various towns in the Netherlands. Working through NIROX Foundation in South Africa, invited 6 artists to submit portfolios of their work for review. Three artists were selected to submit proposed ideas in response to the brief. The other artists commissioned were Rodan Kane Hart based in Cape Town and Phumulani Ntuli from Johannesburg.

The brief was to design and manufacture a flagpole artwork with a maximum height of eight meters. The main inspiration of the work was to be 'nature' but could take on any form as long as it could hoist a flag. Considering the very wet and at times windy conditions in the Netherlands, the work needed to be strong, durable and resistant to corrosion. The flags to be flown are the United Nation Millennium Development Goal flags showing cooperation between African and European cultures.

In response to the brief Beth Armstrong submitted a design comprised of eight flagpoles, their configuration suggesting abstractly the form of a tree. The objective was to keep the design simple, elegant and interesting both from a distance and close up. Each pole represents a United Nations Millennium Goal. Though there will be only one flag flying at a time, the other 'undressed' flagpoles signifying that one goal cannot be achieved without the support of the others.

The position of the sculpture in the centre of a European traffic circle, where the snow and ice of winter and the associated salt will showcase the superiority of the duplex coating and the enhanced corrosion protection afforded by the system.

The sculpture is an outdoor feature which needs to withstand severe corrosive weather conditions and must be able to provide many years of a maintenance free service life. Hot dip galvanizing together with a quality organic over coating was able to offer such an acceptable solution.

Beth Armstrong's UN Millenium Goals Flag Pole Sculpture.

The Kirstenbosch Treetop Walkway ('The Boomslang')

Location: Cape Town, Western Cape

Project Team:
Developer / Owner / Client: Kirstenbosch Botanical Gardens, Cape Town
Architect: Mark Thomas Architects
Project Manager: Henry Fagan & Partners
Main Contractor: Prokon Services
Hot Dip Galvanizer: Advance Galvanizers

While the brief was summarized in a few words: *"To design a pedestrian bridge between the tree tops of the Arboretum at Kirstenbosch"*, the project was indeed a challenging one and is a tale of how well the entire project team worked together as a cohesive entity to bring to life the essence of this succinct brief.

The Centenary Tree Canopy Walkway is a curved steel and timber bridge that meanders through the canopy and over the trees of the Arboretum. Inspired by a snake skeleton this low-maintenance, low impact sculptural raised walkway has been informally named 'The Boomslang' after our beautiful indigenous South African tree snake.

The main spine of the walkway is constructed of a galvanized tubular steel frame, with welded ribs and a light mesh which provides the necessary cross bracing that allows the entire form to function as a continuous bridge-spanning beam. Unbroken shaped timber handrails integrate

The Kirstenbosch Treetop Walkway.

with the arboreal atmosphere while ensuring the safety of the visitor at heights. The decking is slatted pine, appropriately treated and stained to match the surrounding aesthetics, installed in the accommodating walkways' curves. This exceptional structure has achieved the outstanding result of providing a vehicle from which the visitor can enjoy a truly memorable experience.

The planning of integrating such an innovative structure into an environmentally sensitive botanical indigenous garden presented many unique challenges to the project team. The installation of the structure was stringently planned and controlled so as to restrict disruption of, or damage to, the indigenous vegetation. Support columns were positioned so as to eliminate interference of well-developed trees and the associated vegetation. Where it was not possible to avoid a particular tree, the tree was either allowed to pass through the structure, or was tied back to ensure minimum intrusion from the walkway supports. As no on-site cutting or welding modifications were allowed; all components were fabricated and pre-assembled in the workshop to ensure the minimum disruption of the Arboretum at the installation and erection phase of the project.

A hot dip galvanized and painted structure was the corrosion control system of choice. The synergy derived from galvanizing with a paint overcoat provided for the longest possible service life. This avoids difficult and intrusive maintenance and prevents disrupting the Arboretum while also blending unobtrusively with the environment. The Association's code of practice was used to provide the coating specification and acted as a guideline for the duplex system from the preparation phase to the final application of the organic paint system.

'The Boomslang' experience has proven to be extremely popular and the resulting increase in gate income from more visitors allowed for the capital costs of the bridge to be recovered within one year of it being opened to the public.

Sentech DTT Masts

Location (5 separate): Burgersfort, Harrismith, Holy Cross, Ngqeleni, Comfimvaba

Project Team:
Developer / Owner / Client: Sentech Ltd
Architect: GB Draughting (Pty) Ltd
Specifier: Sentec Ltd
Project Manager: Delf Consulting Engineers (Pty) Ltd
Main Contractor: Tass Engineering (Pty) Ltd
Sandblaster / Painter: JR&L Sandblasting
Hot Dip Galvanizer: Armco Galvanizers

Sentech has been given a mandate from government to install a national broadcasting network for Digital Terrestrial Television. This includes expansion of the signal distribution network to underserviced areas. The global switch from analogue to digital television broadcasting provides a greater number of channels that can be broadcast on a frequency range. The picture and sound quality is also superior to that of analogue.

Two contracts were executed. The first contract entailed the installation of new DTT antennas on 17 existing masts. The second contract was for the construction of 7 new transmission sites. The combined projects are valued at around R140 Milllion.

The masts are located in remote areas that were difficult to reach. Transporting of the individual sections to site required special 4 x 4 trucks. This onerous requirement resulted in the specification of a robust corrosion system, since site repairs and touch ups were deemed impractical. It was also a requirement to consider any ecological impacts the towers may have. Reduced maintenance activity on the towers would translate into less disturbance of the eco system. Also in order to reduce future maintenance costs for the towers, the specified corrosion protection system for all

Sentech DTT Masts.

steelwork was:

- Hot dipped galvanizing to SANS 121 (ISO 1461:2009)
- A coat of epoxy polyamide primer
- An intermediate coat of aliphatic acrylic polyurethane
- A final coat of aliphatic acrylic polyurethane

Also, the masts had to be painted in bands of international orange and white markings in accordance with the regulations of South African Civil Aviation Authority.

During the planning stage, Tass Engineering, Armco Galvanizing and JR&L sandblasting had various meetings to set up a process and quality control system to enable the smooth transition between the various processes and companies. The HDGASA was brought in as well to assist in the preparation of the steel after galvanizing for painting. Also best practices were followed to mitigate the risk of distortion of the structural elements.

The final product demonstrates the benefit of a Duplex coating in remote areas. The synergistic effect of a high quality paint system over a well prepared hdg coating has been proven to provide superior corrosion control through a system of both barrier and cathodic protection. Benefits include lower maintenance costs and longer service life when compared to a paint only system.

The Port of Saldanha Landing Platforms

Location: Saldanha Bay

Project Team:

Client: Port of Saldanha

Developer / Owner: TPT – Transnet Port Terminal

Architect: Manfred Kloos – WML Coast

Project Manager: Elton Arendse – TPT

Main Contractor: Guerrini Marine Construction

Hot Dip Galvanizer: Galvatech

The Port of Saldanha Landing Platforms.

The port of Saldanha Bay is home to the export terminal for iron ore arriving from Sishen in the Northern Cape. The massive iron ore carriers arrive at the loading berth empty and when secured at the wharf they float high above the waterline. This situation results in difficult personnel access when boarding the vessel. Once loaded the bulk ore carrier's deck is much lower and personnel access must change to accommodate the varying deck heights.

To accommodate the changing heights a new designed "elevating landing platforms", located at various positions along terminal wharf, was installed for serving personnel of the iron ore carriers. The personnel elevating landing platforms can be re-positioned to any location along the loading wharf. Due to spatial constraints the platforms must be moved during certain docking activities.

The landing platforms operate in conditions that pose numerous challenges. Particularly the severe corrosion conditions of a marine environment. Iron ore dust particles contaminate all surfaces and crevices, which together with sea water and chlorides from the marine environment, are highly corrosive. In the past loading mechanisms experienced the operational problems of a poor service life and seizure of working parts.

The project presented a unique set of challenges involving manufacture, close machining tolerances, distortion control during hot dip galvanizing, sweep blasting and final painting (duplex system).

A multi-disciplinary team was involved in finding a solution to the challenges. Each challenged was addressed from the design stage through to final application of the Duplex coating. Samples were used as part of the are design phase to ensure the mitigation of the risk of distortion and to establish a clear understanding of the final coating thickness and how the accumulated thickness affects the tolerances for final assembly.

In the highly corrosive environment where the landing platforms operate, a maintenance regime of re-painting is scheduled for every twelve to fifteen years. This scheduled activity coupled to the synergistic effect offered by the hot dip galvanized 'priming coat' allows for an estimated predictable service life in excess of seventy five years. The utilization of a Duplex system is a triumph of both form and function in an exceptionally difficult operating environment.

Rejuvenation Projects Category Entries

The SANDF Military Health Base Depot

Location: Thaba Tshwane, Pretoria

Project Team:

Client: The Department of Public Works – Pretoria

User: The Department of Defence: South African Military Health Services

Architect: Jeremie Malan Architects in joint venture with Impendulo

Structural Steel Engineer: Emzansi Consulting Engineers

Main Contractor: Liviero Building (Pty) Ltd

Hot Dip Galvanizers: SupaGalv and Monoweld Galvanizers (previously Robor)

The Military Health Base Depot of the South African Military Health Service is responsible for the acquisition, stockpiling and distribution of medical supplies and pharmaceuticals.

The South African National Defense Force needed to improve and centralize their medical supply base. The South African Medical Health Services required a larger facility that was more secure and modern, than the current base, as a prerequisite to optimized functioning of the crucial establishment.

An existing military property of sixty five hectares, situated in Thaba Tshwane municipality, was selected as the site most suitable for the new base. A number of buildings on selected site were identified as having significant heritage value and the decision was made that these would be retained and integrated in to the new design.

The new base's requirements were met through a eclectic campus type development utilizing twelve buildings of different sizes and functions which included five heritage buildings which were restored and creatively repurposed.

The main function of the base was to provide optimal storage for pharmaceuticals, medical consumables and vehicles. In addition, specialist storage for weapons and ammunition as well as a facility for the control of medical containers was required. Offices, recreation facilities, covered walkways and parking made up the supporting facilities needed at the base.

In keeping with the historic site and existing buildings; the new design was required to retain the aesthetics and industrial characteristics of the existing site's architecture. The historic hanger building had been constructed of structural steel with roofing and side cladding of continuous galvanized sheeting. The new design successfully exploited the stark characteristic elements and strong aesthetics of the revamped buildings which was carried over into the new structures.

Hot dip galvanized steel was the logical material of choice that was specified to for reasons of aesthetics, corrosion control and a long maintenance free service life. All major structural steel members as well as a plethora of steel fittings and components, intrinsic to the design, were hot dip galvanized. Colour coated galvanized sheeting was used on the roof and as side cladding of the large warehouse building.

A key element for the success of this architectural project was a good surface finish on all hot dip galvanized elements. To this end careful detailing of all the steelwork, braces, joints and footings was done in accordance with international best practice. This together with close liaison between the contractor, fabricator and galvanizer produced the desired results of a highly functional, aesthetically pleasing and superbly functional Military Health Depot Base on par with those of any other defense force on the globe.

The SANDF Military Health Base Depot.

Redevelopment of the Tramways Building, Port Elizabeth

Location: Corner of Lower Valley Road and South Union St., Port Elizabeth

Project Team:

Client: Mandela Bay Development Agency (MBDA)

Architect: Dominic Bonnesse Architects

Structural Engineer: Aurecon

Main Contractor: GVK

Structural Steel Contractor: Bisho Steel

Paint Supplier: Sigma Coatings

Hot Dip Galvanizer: Galvanizing Techniques

The historic Tramways Building is one of the first municipal buildings to undertake a facelift and forms part of the agency's plans to revitalise the central business district and Port Elizabeth harbour.

The Tramways Building has had a colourful history spanning over 116 years. Originally housed the municipality electric tram transport system and including the city's own power station and workshops. Later additions included an office facing the river followed later by South Union Street, and still later an Ice Rink and a number of small businesses.

The Tramways Building is at the entrance to Port Elizabeth's central business district and the mouth of the Lower Baakens River Valley

Redevelopment of the Tramways Building, Port Elizabeth.

and situated at the entrance of the Port Elizabeth Harbour.

Following the development of the Coega Harbour, this area has now become available for non-industrial development and the Tramways Building is a key trigger for the rejuvenation of the city's central business district.

Aurecon were appointed by the Mandela Bay Development Agency to undertake the structural design and site monitoring for the rejuvenation of the historic Tramways Building.

The redevelopment entailed both the refurbishing of existing structural steel elements as well as the design of new structures to be placed in the existing building envelope.

The dominant elements of the design are steel structures. Since the building is located within the Baakens River Valley flood plain and less than three hundred meters away from the Port Elizabeth harbour, a solution was sought that optimised the corrosion control of the structures. A Duplex system was specified whereby a suitable paint system was used to overcoat the hot dip galvanized finish of the structural steel.

Today, the project is part of the renovation and upgrading process of the inner city, needed to be revitalised through creating markets for sport, ecology, arts and culture, education and training, conferencing and tourism.

The Duplex Coating System provides both a pleasing aesthetic finish and ensures a service life in excess of eighty years.

The Steinhoff Sandton Eastgate Building

Location: Pretoria Main Road, cnr Marlboro Drive

Project Team:

Client: Steinhoff Property

Developer / Owner: Steinhoff

Architect / Specifier: ConsulTauri Design (Pty) Ltd

Main Contractor: Spiral Engineering

Hot Dip Galvanizer: Armco Galvanizers

The Steinhoff building in Eastgate Sandton posed the challenge that so many other commercial buildings in South Africa experience. Excessive heat from our sunny environment caused the building to be too hot and uncomfortable for the tenants. Due to the excessive heat load the air conditioning cooling systems design parameters were outstripped by more than forty percent. Despite the systems continuous operation it failed to cool the facility to the desired level necessary for the tenants comfort.

In order to address the challenge, ConsulTauri Design where engaged by Steinhoff Properties to find a solution. The design needed to integrate seamlessly with the existing building, reduce heat load by at least forty percent and improve the tenants comfort levels. Reducing energy costs and lowering the cooling systems usage was also an important element of the brief.

In developing a solution ConsulTauri Design investigations into existing aluminium louvres and similar products was undertaken. Most proprietary solutions required extensive work to be done in attaching them to the existing building. It was finally agreed that a stand-alone self-supporting steel structure would provide the solution sought. The structure was designed to be supported by placing the vertical members of a cantilevered structure in hand-augured piles thereby reducing the extent and complexity of needing substantial typical foundings.

The entire structure was galvanized with attention being paid to the quality of the finished product being of acceptable architectural standard. The galvanizer, ARMCO Isando provided the requisite quality control and a finish that met the required architectural.

An innovative and unconventional solution was provided. The brief was surpassed through a freestanding yet integrated building element. In addition to achieving a long service life with no interim maintenance, the energy reduction requirements were exceeded.

The Steinhoff Sandton Eastgate Building.

Infrastructure Category Highly Commended

Port of Richards Bay Floating Break Water Berth 208

Location: Richards Bay Harbour

Project Team:

Client: Transnet National Ports Authority

Designer: WSP Africa Coastal Engineers

Main Contractor: Stefanutti Stocks

Hot Dip Galvanizer: Bay Galvanizers

The bulk liquid berth, Berth 208 in the Port of Richards Bay shares the border with the eChwebeni Natural Heritage site. eChwebeni is a significant conservation area consisting of an ecologically sensitive mangrove ecosystem. Increased shoreline erosion and the deposition of sand by high tidal waters immediately landward of the eroded zone along the shoreline were identified. To mitigate this, the authorities commissioned the construction of a breakwater spanning 660m between Berth 208 and the identified shore zone.

The breakwater is constructed of floating pontoons anchored to ocean floor. Each 15m long, 5m wide pontoon consists of reinforced concrete incorporating hot dip galvanized steel reinforcement. Hot dip galvanized 12mm reinforcing was fixed around the top and sides of the pontoon prior to casting of concrete.

To ensure an extended service life of the pontoons and to control future maintenance costs it was specified that all reinforcing used must be Hot Dip Galvanized. The application of hot dip galvanized reinforcing in concrete has been shown to extend the service life of a concrete structure by 4 to 6 times, providing a maintenance free service life in excess of 35 years.

Judges of the 2016 Hot Dip Galvanizing Awards

Bob Wilmot – Judging Process Coordinator

Bob has been project manager for the building of a number of Hot dip Galvanizing plants and thereafter been responsible for the running of these plants. The design of the plants, the process controls and business models developed by Bob all reflect on his professionalism and expertise in the field

After his corporate and project management roles, Bob joined the Association and soon assumed the role of Executive Director. Although recently retired, Bob retains an interest in industry matters and his insight and under-standing of hot dip galvanizing remain invaluable to the HDGASA.

Spencer Erling – Judge

Spencer graduated from Wits as a Civil engineer and thereafter from UCT with an MBA. Spencer's 30 year career in the structural steel contracting industry covered every aspect of this industry from design to handover of projects as diverse as farm sheds and mining plants to shopping malls. This experience proved invaluable for critically assessing the functional and aesthetic detailing of designs of the projects submitted. Spencer has recently retired from his role of Education Director at the South African Institute of Steel Construction.

Dr. Rod Rankine – Judge

Rod is an expert in construction materials and runs a successful consultancy. Rod is a strong advocate of hot dip galvanizing as a preferred method of corrosion control and is often consulted with by the association on matters related to concrete interfacing with hot dipped steel. Rod is the author of many papers published in accredited journals, conference proceedings and books. Rod provided a highly objective and keen scientific perspective to the judging process.

Mike Book – Judge

Legendary paint contractor Mike Book started employment in the industry with Reef Industrial painters in the early 1970's. During his illustrious career, Mike has remained a stalwart friend and contributor to both the Corrosion institute and the Hot Dip Galvanizing Association. Staying close to all technical developments in the industry, Mike's knowledge of coating systems and in particular his insight into duplex coatings proved especially valuable in the assessment of the duplex coating submissions.

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Duplex Category Highly Commended

The Port of Saldanha Landing Platforms

Location: Saldanha Bay

Project Team:

Client: Port of Saldanha

Developer / Owner: TPT – Transnet Port Terminal

Architect: Manfred Kloos – WML Coast

Project Manager: Elton Arendse – TPT

Main Contractor: Guerrini Marine Construction

Hot Dip Galvanizer: Galvatech

The elevating landing platforms located on along extended gangway are critical to allow for embarking and disembarking of the serving personnel of the iron ore carriers mooring at the Port of Saldanha.

In 2008 the "dust mitigation" project was successfully implemented in Saldanha where the iron ore conveyer system was enclosed with roof canopy frames. A duplex coating system was used on these frames where hot dip galvanizing and a suitable paint system had great success.

A duplex system was specified requiring the condition of the surface to meet at least RE2 on the European scale of degree of rust, after 10 years in an environment of frequent salt spray, chemicals and polluted coastal atmosphere.

The synergistic effect of Duplex coatings, by using appropriate paint systems with hot dip galvanizing provided a life expectancy of corrosion control of 1.5 times greater than that of the individual finishes life expectancy added together.

The financial benefits of reduced maintenance and extending replacement intervals are just as important as benefit of minimising environmental impact in ports.

Joint Architectural Category Winner

The Nelson Mandela Metropolitan University's South Campus Student Housing

Location: Nelson Mandela Metropolitan University South Campus

Project Team:

Client: NMMU Infrastructure Projects

Architect: The Matrix...cc Urban Designers and Architects

Engineer – Structural: Aurecon South Africa (Pty) Ltd / Len Beattie and Associates

Main Contractor: NMC Construction

Steel Contractor: Rizel Engineering / B&D Engineering

Galvanizer: Galvanizing Techniques

Located within two kilometres of the Indian Ocean and exposed to the prevailing winds, it was vital that all mild steel components be adequately corrosion protected to ensure their durability. The obvious choice to perform this task was hot dip galvanizing, which further enhanced the "raw" quality present in the choice of materials used throughout the facilities.

Galvanized mild steel has been used so extensively and effectively, as an integral design element of this project, proving that galvanizing mild steel provides more than merely corrosion control. The vast amount of galvanized mild steel used in the project – columns, balustrades, staircases, bridges, balconies and pergolas – is very noticeable upon approaching and navigating through the precinct and provides an integral and highly visible expression of the value of hot dip galvanizing in a corrosive coastal environment.

The use of hot dip galvanizing also resulted in a product that has a considerably lower maintenance requirement than any other coating systems. The use of hot dip galvanizing provided an opportunity for inherent architectural expression together with the benefits of low maintenance to provide a longer service life and to constrain the costs of running the facilities over the long term.

Judges comment

The use of hot dip galvanizing as an integral element of the design is a key development in the architectural application of hot dip galvanizing technology. From full external structures to balustrades the Matrix Urban Designers & Architects have leveraged hot dip galvanizing for not only its corrosion control properties but more so as a binding element linking all materials throughout the facility with its muted grey patina. Low maintenance cost and an extended service life adds value to the client and ensures that students benefit from the facilities for decades to come.

Joint Architectural Category Winner

The New Tram Street Offices, Pretoria

Location: 273 Tram Street, Nieuw Muckleneuk, Pretoria

Project Team:

Client: Duncharl Investment (Pty) Ltd.

Architect: Jeremie Malan Architects cc

Civil Engineer: Otec

Structural Engineer: Otec

Contractor: JC Van Der Linde Venter Projects

The new Tram Street offices in Nieuw Muckleneuk, Pretoria made excellent use of hot dip galvanizing to improve the architectural environmental impact through hot dip galvanized modular building elements in a soft suburban node. Hot dip galvanized steel was used as the key binding other materials into a coherent whole. The strong and lightweight material required no additional paint finishing or maintenance thereby providing obvious financial and environmental advantages. Combined with its use in high or hard to reach places hot dip galvanizing's advantages over other finishes was clearly the correct decision.

While the building is inland where the elements would not be exposed to an excessively harsh environment, the use of a hot dip galvanizing was used as a means to ensure that the building remains inexpensive and easy to maintain over the long term. Furthermore the hot dip galvanized steel provided designers with a lightweight structure to resolve aesthetic issues relating to sun control and covered spaces for pedestrians and vehicles. All hot dip galvanized steel elements were designed in modular sections, with due consideration given to the sizes of hot dip galvanizing baths available in the region, for ease of erection and storage on site.

The innovative hot dip galvanized steel sun-control grid on both the northern and southern facades integrated hot dip galvanized planter boxes linked to rainwater downpipes for use of the natural rainwater to sustaining the planter's foliage.

With extensive use of hot dip galvanized components this building exposed a wide number of architects, engineers and sub-contractors to hot dip galvanizing, providing a clear point of reference to fellow professionals who have not previously been exposed to the architectural use of hot dip galvanized steel.

Judges comment

The architects' use of hot-dip-galvanized steel as a core element in architecture is well reflected in the innovative and cost effective application of this material. With well detailed design elements linking the external hot dip galvanized steel structure to the concrete and glass elements of this building, the use of hot dip galvanizing has brought 'softening' to a modern building. An example being the hot dip galvanized planters integrated into the rainwater system. An excellently executed project with innovative use of hot dip galvanized steel sets an example for applying cost effective long term benefits for the client in an aesthetically pleasing modern building.

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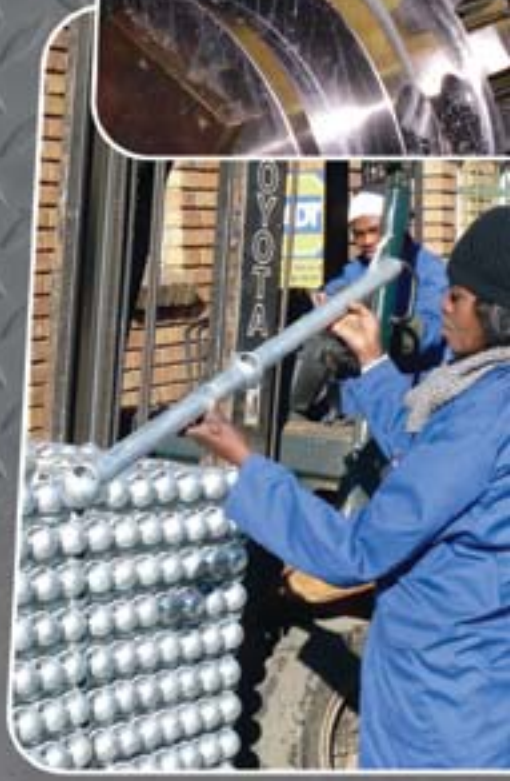

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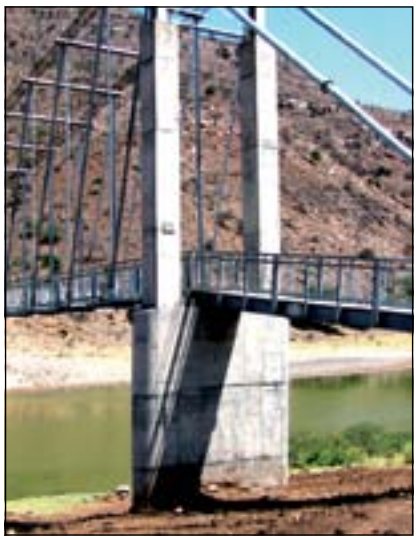
Infrastructure Category Winner

The Uzizi Bridges Project – Tugela Ferry, KZN



Location: Tugela River – Tugela Ferry District in the Uzzi Ward
Project Team:
Developer: Nonkhoo & Associates
Designer: GDB Engineers
Main Contractor: Ingoyama Nicon
Hot Dip Galvanizer: Bay Galvanizers

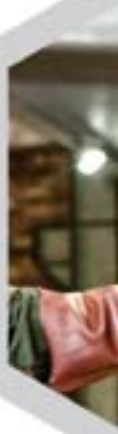
The Uzizi pedestrian bridge is a permanent structure over the Tugela River erected to create a safe crossing point for the local community. The local community used to have to cross the river using twenty litre buckets in to which put their clothes and using this as a 'pontoon' floated alongside the buckets across the river. The children who attended school had to use the same routine on a daily basis to get to the school on the opposite bank of the Tugela.

The Uzizi Bridge consists of two mass gravity concrete anchors. The cables of this magnificent structure are supported by two concrete piers and four columns each six metres in height. The cables span the 120 metres between the piers and support the hot dip galvanized deck superstructure. Two hot dip galvanized steel ramps with supporting concrete columns allow for safe access and egress of the bridge.

The bridge is situated less than 100km in from the KZN coast in a rural area exposed to corrosive coastal elements on a daily basis. The hot dip galvanizing coating was more able to withstand the rough handling in the erection process and required minimal repairs to the coating after the erection process was complete. Using only a barrier system, maintenance would need to happen more often and frequent check-ups would have been frequently to identify any damage to the coating and prevent undercoat corrosion creep that could lead to structural failure. Maintenance on a yearly basis would have been detrimental to the biodiversity of the river system. This would have increased the cost of maintenance but potentially be a risk to the safety of the end users of Uzizi Pedestrian bridge if not conducted diligently at the required intervals. The hot dip galvanizing protects the steel bridge through sacrificial corrosion protection making it perfectly suitable for high traffic areas like handrails and gratings where cuts and scratches occur. With a greater need for these bridges across the rivers in our country hot dip galvanizing is proving itself as the defender of the rural pedestrian across the length and breadth of South Africa.

Judges comment

The Uzizi Bridges Project has provided infrastructure to rural KZN. The hot dip galvanized system was chosen for its long term corrosion control mechanism combined with its muted natural finish that blends well with the natural environment of the Tugela River complex. This provided not only utilitarian benefits but also a pleasing aesthetic to the region. Hot dip galvanizing was selected, not only, as a corrosion control technology but the finish also allowed for the harsh pre build environment and material handling. The value to the community and the longevity of the infrastructure in an otherwise harsh environment is testimony to the team that designed, fabricated and installed life changing infrastructure. This simple structure will become the engine to improved economic development of the region for decades to come.



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Rejuvenation Projects Category Winner

The SANDF Military Health Base Depot

Location: Thaba Tshwane, Pretoria

Project Team:

Client: The Department of Public Works – Pretoria

User: The Department of Defence: South African Military Health Services

Architect: Jeremie Malan Architects in joint venture with Impendulo

Structural Steel Engineer: Emzansi Consulting Engineers

Main Contractor: Liviero Building (Pty) Ltd

Hot Dip Galvanizers: SupaGalv and Monoweld Galvanizers (previously Robor)

The new Medical Health Depot Base was built in response to the Department of Defence's requirements for a more secure and larger modern base to ensure the effective operational preparedness of medical supplies for the Medical Health Service of the National Defence Force of South Africa (SANDF).

A SANDF property, with several existing buildings on a site of 64 571m² in Thaba Tshwane was selected. A number of the existing buildings on site were identified as being of significant heritage value and the decision to retain them as rejuvenated elements of the new design was made.

The final development comprised 12 buildings, including the 5 heritage structures for a variety of functions, The 5 heritage buildings were rejuvenated and creatively adapted for re-use. In keeping with the historic warehouse character of the site the new building designs displayed an industrial aesthetic. The existing hangar buildings where core to the use of steel structures and sheeting. The design exploited these aesthetics in the new buildings. Of the existing buildings on site, two old Bellman type steel aircraft hangars and one railway type platform building had to be retained and restored as per heritage legislation. All were re-fitted internally to accommodate new functions. The doors of one of the hangars were stripped of sheeting to expose its steel skeleton as a feature. The steel structure skeleton of another hangar was retained and re-cladded with steel and translucent roof sheeting to create a covered ceremonial area. Complete steel structures of another four hangars were carefully dismantled, documented and re-erected on site within the design layout. Hot dip galvanized steel was used as loose attachments in the form of walkways, balustrades and tree guards which further enhanced the contrast between old and new.

The design engineer attended a workshop on the improvements in hot dip galvanizing technology which was conducted at Monoweld Galvanizers (previously Robor) hosted by Professor Stephens Yeomans of University of New South Wales, Canberra, Australia. The exposure to the extensive applications which hot dip galvanizing is being used, from galvanized reinforcing steel for durable concrete structures to architectural finish for visual impact, assisted the design engineer in ensuring a specification and application of hot dip galvanized steel was implemented throughout the project in line with international norms and best engineering practices globally. Quality of work was consistently monitored by the galvanizers, steelwork sub-contractors and the main contractor to ensure a high quality final product was achieved. Each hot dip galvanized steel member was meticulously detailed for obtaining the best possible results from the hot dip process with architectural, structural and workshop drawings produced in accordance with the required specifications and standards.

The use of hot dip galvanized steel canopies provided the necessary protection for the pedestrian walkways linking all buildings on the facility. The canopy roof in the heritage area was designed as a lightweight structure cantilevered from a single line of columns to minimize the visual impact on the rejuvenated historic buildings .In other areas sturdy concrete stub columns support the steel columns, emphasizing the structural strength and relative lightness of steel. These light structures provide an unobtrusive and elegant physical connection between new and historic buildings. The galvanized finish was used as the continuous visual element binding the buildings of the base into a cohesive facility having a strong and ordered identity synonymous with a modern military base. The project

was unique in the way that galvanized steel was used across the extended facility, not merely as a modular building element more so as the aesthetic visual element joining the component elements, the buildings, circulation routes and site. Galvanized steel, due to its unique properties, was utilized as the key ingredient binding all other materials, i.e. concrete, brick, steel sheeting and glass, into the defining whole as a modern strong and effective military base.

Judges comment

Rejuvenation and reutilization in architecture has been a primary development in the face of harsh economic times and the need to optimise the use of existing resources for the benefit of society. This rejuvenation and optimization of facilities for the South African Medical Services is a superb example of innovation and optimization. From the repurposing of existing buildings and the integration within a larger development which used hot dip galvanized steel as the arterial element. This provides not only effective use of existing assets but also ensures a long service life facility. Whilst the facility makes an aesthetically pleasing impact, closer inspection reveals excellence in design detailing. This detailing facilitates the successful integration of the old and new.

Duplex Category Winner and Overall Winner of the Walter Barnett Trophy

The Kirstenbosch Treetop Walkway ("The Boomslang")

Location: Cape Town, Western Cape

Project Team:

Developer / Owner / Client: Kirstenbosch Botanical Gardens, Cape Town

Architect: Mark Thomas Architects

Project Manager: Henry Fagan & Partners

Main Contractor: Prokon Services

Hot Dip Galvanizer: Advance Galvanizers

The Kirstenbosch Botanical Gardens Tree Canopy Walkway or 'The Boomslang is situated between the Protea Garden, Cycad Amphitheatre, the Dell, Mathews Rockery and the Concert Lawn. The walkway takes the visitor from the forest floor into and through the trees and bursts out above the canopy, giving spectacular panoramic vistas of the surrounding mountains, Garden and Cape Flats.

This 130m long slender walkway discretely snakes its way through the canopy of indigenous trees almost invisible in the way its natural lines blend with the vegetation. The walkway is crescent-shaped and takes advantage of the sloping ground; it touches the forest floor in two places, and raises visitors to over 11.5m above ground. While being wheelchair-accessible visitors in wheelchairs will need assistance to negotiate the steep gradients to get to the walkway.

The Centenary Tree Canopy Walkway was built to celebrate the centenary of the Kirstenbosch Botanical Gardens established in 1913.

The construction costs were met entirely from bequests from many benefactors – in particular from the late Mary Mullins.

The bridge was designed to safely support a load of up to 500 kilograms on every square meter of bridge deck thereby catering for around 1 300 people at once.

With submerged foundations, hand-dug with reinforced concrete pads, in select positions approximately 12m apart. The excavations for the foundations were done under careful supervision and care was taken not to compromise any of plant root structures. The walkway was elevated on columns, steel H-sections, with a lattice of steel rod around them to allow creepers to grow upwards along the column camouflaging the steel in a cloak of vegetation.

The structure was painted with two layers of epoxy undercoat before installation and a top coat afterwards, a first for South Africa with only a similar corrosion control system having been previously used in London's Royal Botanical Garden. The technology of the Duplex system was selected after considering two primary objectives, the need for near natural aesthetics and low maintenance high performance corrosion control within a highly sensitive environment. The Duplex corrosion control system promotes and exploits the benefits of using hot dip galvanizing together with a suitable paint system. The Duplex system will provide a maintenance free service life, in excess of 40 years. With aesthetics of primary importance and the system allowed for the design to blend into the very sensitive environment of the Kirstenbosch Botanical Gardens.

While the initial investment required a marginally more increase in investment (10% to 15%) against a three coat paint system, the life cycle analysis showed that the Duplex system would provide a substantial saving over that of only paint. This investment was recouped within the first year of the walkway being opened with visitors enthralled at this wonderful experience.

This high profile installation that is neither intrusive nor disruptive within a rather unique and very sensitive environment and does not intrude upon the natural ambience of the garden. The project represents the concept that man and nature can truly exist in harmony using leading edge technologies and awareness of the role our built environments play in our everyday lives.

Judges comment

Kirstenbosch National Botanical Gardens has always been a gem in the South African celebration of our biodiversity. The Boomslang project is an essay in excellence that has been recognised not only by the Hot Dip Galvanizing judges but in many other spheres of engineering, architecture and material science. The design itself is a perfect integration of man-made environment with nature, through architectural lines that mimic nature's natural curves and flow. The utilization of the Duplex finishing system, a hot dip galvanized steel and paint barrier, coloured to blend into the canopy of the arboretum. This provides ultimate service life while blending well with the natural colours of the surroundings. The project deserves the highest accolades in all aspects from concept to design, fabrication and erection all performed with a commitment to the preservation of nature.

The Metsep acid regeneration process

By Ian Tunnicliffe OSS Sales and Services (Pty)Ltd

Manufacturing and creating any product requires raw material and energy and inevitably leads to the generation of industrial waste that can have harmful effects on environment. It is important that companies take care of their waste with responsible waste management and adopt a waste minimization and prevention culture within their sphere of operations.

It is important to understand that environmental management, preserving and protecting the environment, is not only a national but also an international focus point. As such it is highly legislated and continuously under scrutiny from organs of government. South African law exempts no one, be it corporate and/or government organs, from practicing responsible environmental practices.

Worldwide increase of public concern for the natural environment has been one of the most important developments in recent decades. Globalisation has helped to amalgamate societies and their environmental fates more closely than ever before. At the same time environmental problems increasingly transcend national borders and pose serious challenges to the health of the planet. The development of more effective environmental laws and legal systems throughout the world has thus become critical to directing economic development and growth onto the path of environmental sustainability.

The economies around the world have created a crisis of confidence in virtually all institutions, private and public. The most obvious is compliance with local environmental laws and regulations as well as Pressure from an organization's supply chain. For instance, more organizations are calling for their suppliers to comply with the Environmental Management System (EMS) standard of the International Organization for Standardization (ISO).

Whether you are a business, a non-profit or governmental body, the burden of proof insofar as demonstrating a full and comprehensive understanding of the implications of transparency and accountability is the responsibility of directors and management.

Why are environmental issues important

Section 24 of the South African constitution states as follows: *"Environment – Everyone has the right*

(a) to an environment that is not harmful to their health or well-being,

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that –

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

(iii) secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development."

In the past a commitment to ethical behaviour in business strategy, operations and culture has been on the periphery of corporate governance and Board leadership, linked mainly to corporate reputation. However, things are rapidly changing in today's globalized and interconnected world, investors, creditors and other stakeholders have come to recognize that environmental, social, and governance responsibilities of a company are integral to its performance and long-term sustainability. It has become clear that without this attitude towards corporate governance it will become more

Certified Galvanizers Inspector's Course Level II

October 2016

The HDGASA ran the advanced Level II course in October 2016. The attendees at the course were:

Carel van der Merwe and Gustav Oehley from CIS Engineering, Ruan Thiart of Petrotech Services and Moses Chili an Engineering Technologist from the Department of Water & Sanitation.

The delegates were lectured on the necessary skills to assess the quality and conformance of hot dip galvanized coatings and Duplex Systems to the applicable specification. They were also introduced to other metallic type coating specifications and their appropriate applications for corrosion control design.

The course included a visit to a hot dip galvanizing plant where the delegates had the opportunity to examine quality standards first hand. The delegates conducted an actual inspection and were evaluated against their respective report back as part of the competency requirements for qualifying as an inspector.

The delegates undertook a two part theoretical examination on the last day of the course. By achieving successful results at a high grade level (>75%) the delegates were issued with a certificate of competency and were registered as an approved HDGASA hot dip galvanizing and duplex system inspectors.

Left to right: Carel vd Merwe (CIS Engineering), Ruan Thiart (Petrotech Services), Gustav Oehley (CIS Engineering) and Moses Chili (Department of Water & Sanitation).

Congratulations and welcome to our latest graduates as professional inspectors accredited by the Hot Dip Galvanizers Association Southern Africa.

and more difficult for companies to operate successfully and sustain growth. Boards must incorporate these new dimensions into their core decision making processes. Today, these environmental and socio-economic/political concerns help determine profits. Companies are now required to be responsible Corporate Citizens.

A new business philosophy is emerging, one where a set of core values, encompassing human rights, environmental protection and anti-corruption measures, guide the board's oversight relationship with management, and accountability to shareholders. Boards, collectively and directors individually, are central in accomplishing these objectives.

Sir Adrian Cadbury said that, *"corporate governance is concerned with holding the balance between economic and social goals and between individual and communal goals."* The global trend towards this type of governance is evidenced by a growing number of global and industry specific initiatives. Chief among these are the OECD[1] guidelines.

Environmental programmes have many benefits; and can provide financial benefits, such as reducing operating costs, lead to new markets and technologies, improve employee health and morale. Good management of environmental, social and governance responsibilities strengthen reputation and brand value. These are all important business principles, which we all should entrench in our respective businesses.

Effective corporate governance requires buy-in and commitment from a broad network of business stakeholders, including shareholders, employees, customers and communities. If stakeholders are adversely affected by a company's actions, shareholder value will suffer.

Legislative framework

Section 1 of the National Environmental Waste Management Act[2] ("NEMA") contains a number of principles which serve as a general framework and guide for the interpretation, implementation and administration of all environmental laws and all laws concerned with the protection and management of the environment. The environment is defined in NEMA as: *"the surroundings within which humans exists and that are made up of (i) the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical chemical, aesthetic and cultural properties and conditions of the fore going that influence human health and well-being".*

Pollution is defined as *"any change in the environment caused by –*

(i) substances,

(ii) radioactive waves, or

(iii) noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances construction and the provision of services, whether engaged in..."

In particular, the "Polluter Pays" principle, requires that the *"costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment"*.

The "Polluter Pays" principle is encapsulated in the duty of care provisions contained in section 28 of NEMA. Section 28(1) of NEMA requires *"every person who causes, has caused or may cause pollution to take reasonable measure to prevent significant pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment".*

Any act or emission by any person, including juristic persons i.e. companies, which caused pollution may render them responsible for undertaking "reasonable measures" to remedy that pollution.

Liability only arises where there has been a failure to take those measures. Although the persons who may be responsible in terms of section 28(1) are not limited, section 28(2) specifically provides that the duty of care falls upon:

- The owner of the premises;
- A person in control of the land or premises; and
- A person who has the right to use the land or premises on which or in which an actively is or was undertaken or any other situation exists which is likely to cause pollution and/or degradation to the environment.

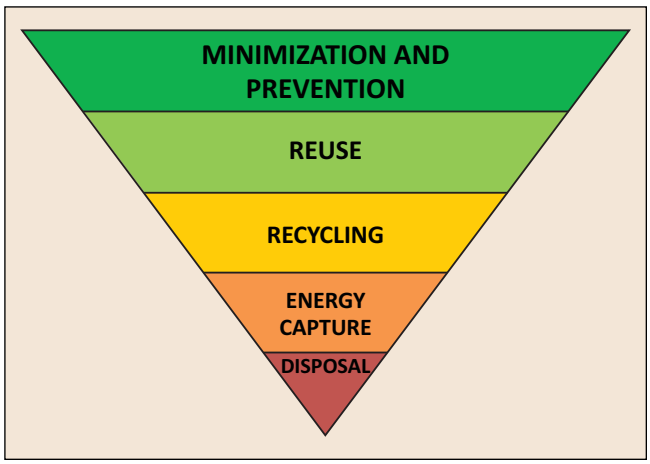

Diagram 1.

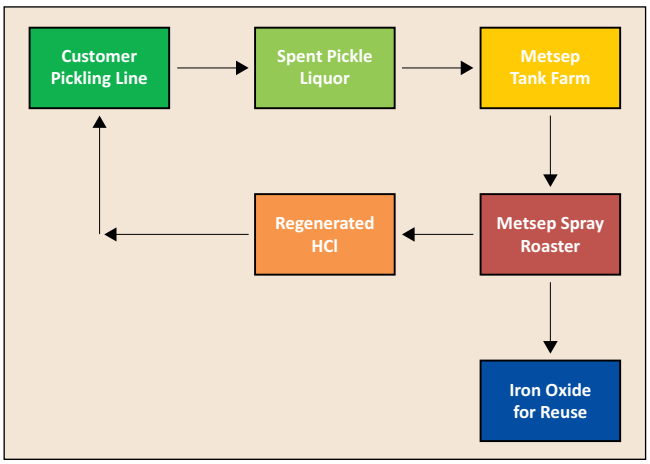

Diagram 2.

Metsep and its core business

Metsep services the hydrochloric acid pickling industry, The Pickling Process conforms to the following equation:

$FeO + 2HCl \longrightarrow FeCl_2 + H_2O$

You will notice that as the Iron Oxide and the hydrochloric acid on the left hand side of the equation the chloride and oxygen swap places to give the products on the right hand side of the equation ferrous chloride and water, or Spent Process liquor as it is known in the industry.

Why is the Metsep process sustainable and environmentally friendly

The Metsep Acid Regeneration Process (ARP)

The ARP utilizes the spray roaster process or pyro-hydrolysis. The process is a method of reversing the pickling process. The feed stock to the plant, the SPL as noted above is a solution of ferrous chloride and water ($FeCl_2 + H_2O$). This solution is sprayed into the pyro-hydrolysis reactor at a temperature of between 600 and 800 centigrade, at this point the following reaction takes place:

$4FeCl_2 + 4H_2O + O_2 \longrightarrow 8HCl + 2Fe_2O_3$

$2FeCl_3 + 3H_2O \longrightarrow 6HCl + Fe_2O_3$

As you can see from the equation above this process is a reversion of the pickling process, that is, it reverses the pickling action. By the addition of oxygen, heat and water, the oxygen and Chloride in the left hand side of the equation are forced to change places giving us back the HCl and Iron Oxide in the right hand side of the equation.

From the environmental point of view this methodology is in perfect sync with the essence of the NEMWA Act 59 2008. The Waste management act is centered around the international hierarchy of waste, that is minimization and prevention, reuse, recycle, energy capture, disposal. As far as this is concerned Metsep and its core business and process goes straight to the top of the class i.e. minimization, prevention and reuse *(see Diagram 1)*.

The Metsep business and process also fits very well with the objectives of the Waste Act 59 2008, and they are as follows:

- To protect health, well-being and the environment by providing reasonable measures for:
- minimizing the consumption of natural resources
- avoiding and minimizing the generation of waste
- reducing, re-using, recycling and recovering waste
- treating and safely disposing of waste as a last resort
- preventing pollution and ecological degradation
- securing ecologically sustainable development while promoting justifiable economic and social development
- promoting and ensuring the effective delivery of waste services
- remediating land where contamination presents, or may present, a significant risk of harm to health or the environment
- achieving integrated waste management reporting and planning

Metsep is also looking after the interests of its client base by carrying out its core business, as the client, as a generator of waste, has responsibilities outlined below.

General duties in respect of waste management

1. A holder of waste must, within the holder's power, take all reasonable measures to:
    - avoid the generation of waste and where such generation cannot be avoided, to minimize the toxicity and amounts of waste that are generated
    - reduce, re-use, recycle and recover waste
    - where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner
    - manage the waste in such a manner that it does, not endanger health or the environment or cause a nuisance through noise, odour or visual impacts
    - prevent any employee or any person

under his or her supervision from contravening this Act

- prevent the waste from being used for an unauthorized purpose.

2. Any person who sells a product that may be used by the public and that is likely to result in the generation of hazardous waste must take reasonable steps to inform the public of the impact of that waste on health and the environment.

3. The measures contemplated in this section may include measures to:
   - investigate, assess and evaluate the impact of the waste in question on health or the environment
   - cease, modify or control any act or process causing the pollution, environmental degradation or harm to health
   - comply with any norm or standard or prescribed management practice
   - eliminate any source of pollution or environmental degradation
   - remedy the effects of the pollution or environmental degradation.

If Metsep did not exist what would the options be?

Spent Pickle Liquor (SPL) is a hazardous waste product so the disposal options are few and restrictive. If it were to be treated on site, you would need to precipitate the iron which would go to landfill and ensure the resultant neutralized liquor conforms to local municipality consent to discharge limits for parameters like pH, conductivity, TSS, TDS amongst others. This would be a total loss system, creating environmental hazards and future liabilities.

The Metsep process however is a total closed loop recycling option and is sustainable and environmentally responsible method of laundering a waste product and returning it for re-use.

Diagram 2 represents the typical flow of SPL from the customer, to Metsep for treatment in the spray roaster, SPL reversion and then back to the customer, in a total closed loop system.

It should also be noted that the amount of Greenhouse gases produced by Metsep is very little if we consider that most of the reactant gases at Metsep are considered "non -greenhouse gases". Although contributing to many other physical and chemical reactions, the major atmospheric constituents, nitrogen (N_2), oxygen (O_2), are not greenhouse gases. This is because molecules containing two atoms of the same element such as N_2 and O_2 and monatomic molecules such as Argon (Ar) for instance have no net change in their dipole moment when they vibrate, hence are almost totally unaffected by infrared light. Although molecules containing two atoms of different elements such as carbon monoxide (CO) or hydrogen chloride (HCl) absorb Infra-Red, these molecules are short-lived in the atmosphere owing to their reactivity and solubility. Because they do not contribute significantly to the greenhouse effect, they are usually omitted internationally when discussing greenhouse gases.

References

1 *www.oecd.org/corporate Principles of Corporate Governance.*

2 *Act 59 of 2008.*

History of zinc, its production and usage (Part 1)

Dr. Marinanne Schönnenbeck and Frank Neumann (subedited and reprinted from a published report by Rheinzink)

The origin of the word "zinc" is unclear and may have possibly been derived from the Persian "sing", which means "stone" or the German term "Zincken", which was a reference to the jagged shape of calamine ore.

Long before the discovery of zinc as a metal, zinc ore was already being used to produce the copper-zinc alloy as brass as well as zinc salts for medical purposes. Objects made of brass are known from Babylonia and Assyria from 3000 BC, and from Palestine dating from 1400 BCE – 1000 BCE.

The addition of zinc to copper for the first time was proven by a piece of jewellery from around 500 BCE found on Rhodos. While zinc was used from that period onwards to produce brass it was several centuries before it as identified as a metal and chemical element. The name "zinc" only came into general use in the 17th century following rediscovery of the material. Zinc was found to be especially suitable for alloys with other metals and was first employed in the production of early coins. Zinc was primarily imported from India until the end of the 18th century and was considered to be very costly.

Metallic zinc was first produced in India around 1200 CE, and the process is described as the production of a new metal similar to tin. It involved heating the zinc-ore indirectly with charcoal in a covered crucible. This produced zinc vapour, which was cooled by the ambient air in a condensation recipient underneath the crucible. Thus is how metallic zinc was formed.

It was claimed that Marco Polo (1254CE – 1324 CE) from Venice reportedly wrote about the known production of zinc oxide in Persia. At this time the Persians used a solution of zinc vitriol to treat eye inflammations. Even today zinc sulphate is used in medicine as an astringent and antiseptic.

By 1374 CE zinc had been recognised by the Hindus as a new metal, the eighth metal element discovered to date in that age. However zinc production and trading was already underway at this time albeit on a limited scale.

A modified process was known to be used in the province of Rajasthan in the northwest of India between the 12th and 16th century. There tube-shaped crucibles 25cm in length and 15cm in diameter were equipped with a tube of a smaller diameter. The crucibles were stacked in an oven, which was heated with charcoal and stoked with a bellows. The zinc vapour then condensed in the tubes. This method provided for the extraction of around 1 million tons of metallic zinc and zinc oxide – judging by the residues found at this site. This metallic zinc was used to produce brass, while the zinc oxide produced was destined for medical applications.

China also has records describing a production process used by them in 17th century. The method involved mixing zinc ore and powdered charcoal in individual crucible. These were then stacked into a pyramid shape with coals between the spaces. The entire structure was heated until red-hot; then cooled down and broken apart. Zinc was found to be deposited at the centre of the structure as round lumps of zinc metal. During the Ming dynasty (1368 CE – 1644 CE) China was already using coins containing 99% zinc and 1% silver. As the production of zinc increased it was exported from India and China to as far afield as Europe.

The Greek geographer and historian Strabo (64 BC to 23 AD) claimed that only

Figure 1: In India around 1200 AD metallic zinc was produced in a covered crucible. From there it passed into a condensation recipient, where it was cooled by the ambient air (according to Habashi).

Figure 2: Production of zinc in 17th century China, using crucibles stacked into pyramids with charcoal between the spaces. After being heated until it was red-hot and subsequent cooling, the slag was broken apart to find the zinc in the middle (according to Habashi).

"Cyprian ore" contained the necessary constituents for the production of brass. He also mentions a mineral that turns into iron when burnt and, if then melted in an oven with certain constituents; "mock silver" (i.e. zinc) could be distilled. This material could itself be used in producing brass by alloying it with copper.

It has been postulated that in Rome at the time of Augustus (63 BCE to 14 CE) brass was produced by heating up a mixture of powdered calamine, charcoal and granules of copper while keeping the temperature below the melting point of copper. The zinc vapours released would then start to react with the copper and the temperature was then increased thereby smelting brass. The visual similarity between brass and gold probably spurred on the alchemists quest to produce gold from other base metals.

In the mid-13th century the natural scientist, philosopher and theologist Albertus Magnus described, without even knowing of zinc as a metal, a process that allowed the level of zinc in brass to be increased during

smelting. His method involved scattering crushed glass over the molten mass to produce slag. The slag prevented the zinc escaping from this mass as vapour hereby increasing the zinc content of the brass.

The works "De natura fossilium" (1546 CE) and "De re metallica" (published in 1556 CE) by Georgius Agricola (1494 CE – 1555 CE) a humanist, physician and mineralogist from Saxony ,described how, during the extraction of silver and lead in Germany's Harz Mountains, a white metal was found to be deposited on the walls of the furnace and was used as an imitation for gold.

The physician and natural scientist Philippus Theophrastus Paracelsus (1493 CE – 1543 CE) was the first to clearly identify "zincum" (zinc) as a new metal in Europe , which differed from the other metals known at the time in terms of its properties. During this period zinc was still primarily sourced from the Orient.

One major challenge during the extraction of zinc at the time was its tendency to vaporise below the melting temperature of the base metal, which is over 1 000°C. With the ingress of air the zinc then combusted into zinc oxide. During smelting the resulting zinc vapour neded to be captured and condensed without the ingress of air to ensure deposit of metallic zinc were realized.

In the 18th century the metal was extracted on an increased scale in England, Upper Silesia (in what is now Poland) and in the Aachen-Liège region.

In 1746 CE the Berlin chemist Andreas Sigismund Marggraf (1709 CE – 1782 CE) succeeded in isolating zinc as a pure metal. In his experiment Marggraf heated zinc ores from various sources together with charcoal in covered crucibles and obtained metallic zinc from all of them.

Shortly before 1746 CE the Swedish scientist Anton von Swab (1703 CE – 1768 CE) succeeded in distilling zinc. As the vapours ascended upwards during this process passing in to the capture vessel and was known as distillation "per ascendum".

The process of smelting zinc in a retort oven was observed in China by an Englishman, William Champion (1709 CE – 1789 CE). Champion then developed a production process using a vertical retort oven that involved placing zinc ore and coal in covered crucibles with an opening at the bottom. The melted zinc then ran into an iron pipe extending into a cooling chamber beneath the crucible. The metallic zinc was collected at the closed end of the pipe where it was cooled using water. The process allowed some 400kg of metallic zinc to be extracted in an oven with 6 crucibles over a period of approximately 70 hours. The first zinc smelting plant was opened by William Champion at Bristol, England in 1743 CE.

In 1798 CE Johann Ruhberg (1751 CE – 1807 CE) built the first zinc smelters in Upper Silesia using a horizontal retort oven that he had developed. Here the individual crucibles were positioned horizontally in the furnace, allowing them to be charged and removed without cooling. Arranging the crucibles in banks resulted in a major fuel saving. Initially the raw material used in the

METSEP sponsor exhibition equipment to HDGASA

METSEP sponsored a comprehensive set of indoor and outdoor exhibition equipment for the Hot Dip Galvanizers Association. The equipment will be used to promote Hot Dip Galvanizing at relevant events with high visibility branding of the Association. Robin Clarke, executive director, of the HDGASA gratefully received the equipment at the METSEP head office in Heriotdale, Johannesburg, from METSEP Managing Director Robert Watchorn.

The Association would like to thank METSEP for this gracious sponsorship which will be well used in the future to promote the benefits of Hot Dip Galvanizing and Duplex Coatings as the premier corrosion control for steel.

Robin Clarke (Executive Director - HDGASA) receives sponsored equipment from Robert Watchorn (Managing Director – METSEP).

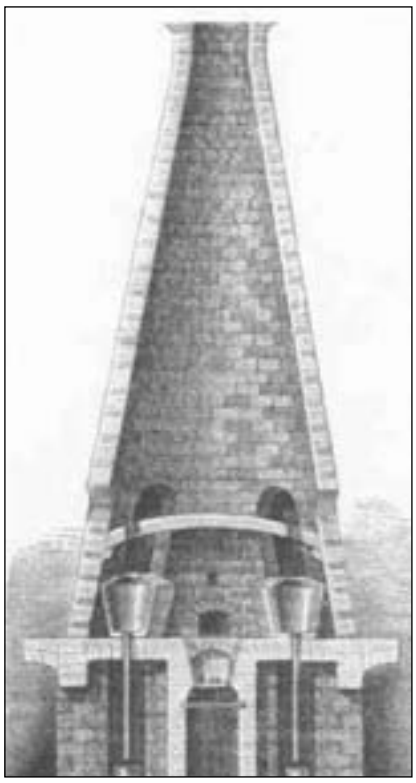

Figure 3: Zinc smelting oven, as used by William Champion at his zinc smelting works in Bristol (according to Habashi).

process was zinc galmei (calamine), a by-product of lead and silver mining.

This was followed by the use of Smithsonite ($ZnCO_3$), an ore that is easy to smelt, and even later by zinc blende (ZnS), which was first converted into zinc oxide by roasting. This soon gave rise to new zinc works in Silesia, the Aachen-Liège region and Germany's Ruhrgebiet. Zinc blende was also produced as a waste-product when mining for silver minerals, and its usage again became of interest later on with

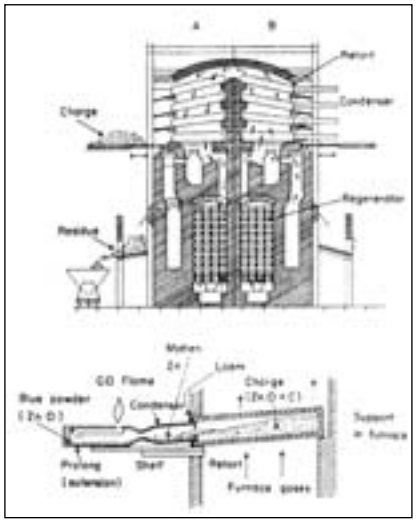

Figure 4: Diagram of horizontal retort oven (according to Habashi)

the emergence of newer zinc extraction processes.

When zinc blende (ZnS) was roasted it released sulphur dioxide, a major pollutant of the environment around the smelting works. Later, however, it became possible to convert the roasting gases almost entirely into sulphuric acid.

Construction of a Belgian zinc works in 1810 gave rise to the Societé de la Vielle Montagne. A few years later it was the world's largest producer of zinc, using a slightly modified version of the horizontal process. The zinc smelting plants in the United States used this same method from the middle of the 19th century and by the beginning of the 20th century, these plants produced almost a third of the world's production of zinc.

A new process was developed in 1805 for rolling zinc into smooth sheets of metal at between 100°C and 150°C. This material would also be used successfully in the building industry to make roof coverings, gutters and downpipes. This paved the way for the opening of the first zinc sheet plants in Belgium and Silesia, were zinc was mined, smelted and rolled into sheets with standard dimensions of 1m x 2m.

In the early 19th century the shining blue-white material was used by people such as Karl Friedrich Schinkel for ornamental sheet-metal work. This was recorded in numerous technical publications dealing with the techniques for installing smooth sheeting which included details of the joining and connection of this material. It was only in the mid-1960s that this so-called "Pack Rolling Process" was superseded by more modern technology.

Galvanizing of steel sheeting and large structural steel components blossomed as a key application for zinc thanks to its corrosion control properties. The 19th century saw the production of zinc rise together with the increasing use of steel. Zinc was also in demand for the production of brass, red bronze and nickel silver. While zinc's application in die-cast parts became boded well for the zinc industry as zinc was added to drugs, cosmetics and to animal feed as a supplement. Zinc as a commodity had come of age.

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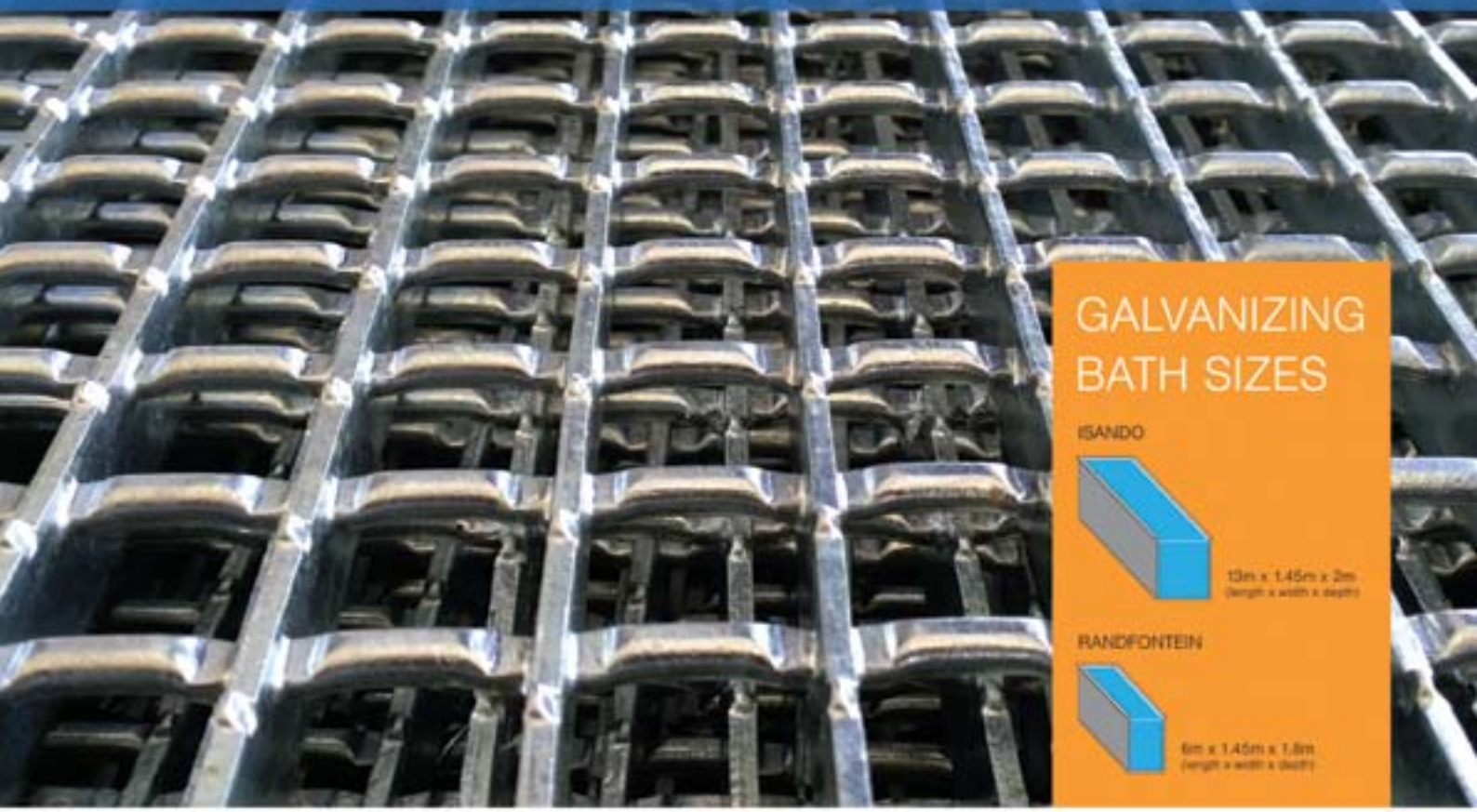
Hot dip Galvanizing Members

GALVANIZER	LOCATION	TEL. NO	SPIN	NO. OF LINES	BATH SIZES (L x W x D) (m)
GAUTENG					
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 6.8 x 0.9 x 1.4 6.5 x 0.9 x 1.5 6.45 x 0.755 x 0.9
Galvadip (Pty) Ltd	Silverton	012 843 8000		1	7.0 x 1.7 x 2.0
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	 Tube	3	14.0 x 1.35 x 2.5 10.0 x 2.0 x 4.0 Dia 42mm to 114mm max tube length 6.7m
Pro-Tech Galvanizers (Pty) Ltd	Nigel	011 814 4292	•	2	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
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 In-line and general	Nigel	011 814 1113		4	12.5 x 1.2 x 1.8 9.0 x 1.0 x 1.0 8.0 x 1.2 x 1.5 6.0 x 1.3 x 1.3
WESTERN CAPE					
Advanced Galvanising (Pty) Ltd	Bellville	021 951 6242		1	14.0 x 1.4 x 3.0
Galvatech (Pty) Ltd	Bellville	021 951 1211		1	7.5 x 1.5 x 2.6
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)
EASTERN CAPE					
Galvanising Techniques cc	Port Elizabeth	041 486 1432		1	12.0 x 1.3 x 2.3
Galvaspin (Pty) Ltd	Port Elizabeth	041 451 1947	•	1	3.0 x 1.2 x 1.8
Morhot (Pty) Ltd	East London	043 763 1143		1	7.0 x 2.5 x 1.5
KWAZULU/NATAL					
A&A Galvanisers	Pietermaritzburg	033 387 5783	•	1	3.3 x 0.9 x 1.9
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
INTERNATIONAL					
MAURITIUS					
Galvanising Co Ltd	Port Louis	+230 234 5118		1	7.0 x 0.75 x 1.68
ZIMBABWE					
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!**



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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.

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