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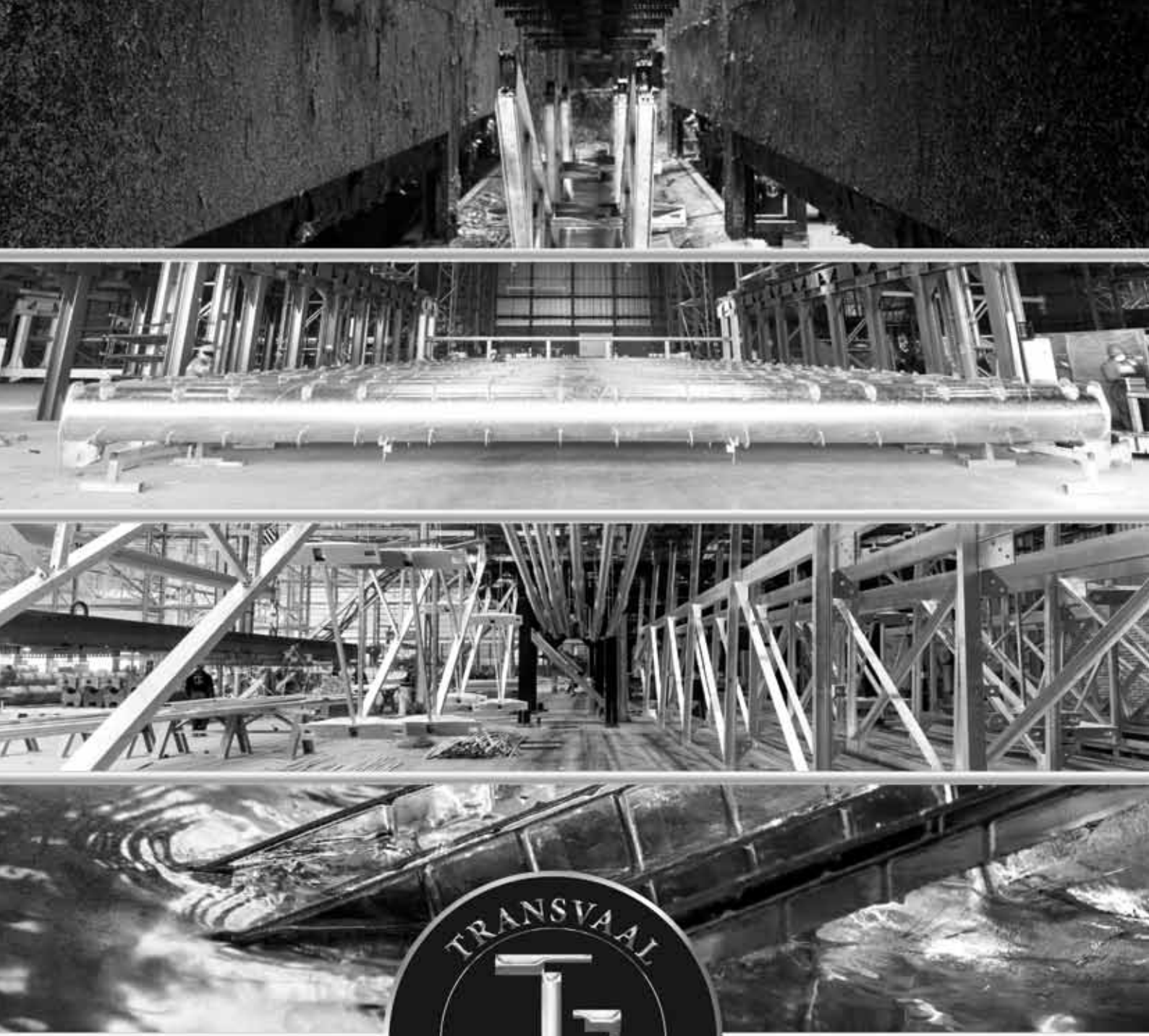
HOT DIP GALVANIZING TODAY 81

The Official Publication of the Hot Dip Galvanizers Association Southern Africa

CORROSION CONTROL OF STEEL



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EXECUTIVE DIRECTOR'S Comment

Whilst tempting to launch into all our industry challenges related to the supply of power, I shall put that on hold for our next edition. Rather, to all our galvanizers, customers and industry associates I wish you all a very happy new year. All the best for 2023!
Issues of health and safety were sharply brought back into focus by the tragic events related to the LP gas tanker explosion in Boksburg. This reminds us never to take for granted the basics. In the context of hot dip galvanizing practices, the need to have fabricated items with substantial vent and drain holes on hollow sections is essential. Also welds which join materials of substantial cross -sectional thickness ideally need to be stitched to allow for escape of any trapped fluids from the cleaning process. Such simple detail is easily foregone in the quest for speed and low cost of production, until something goes wrong. Inevitably the cost in damage to life and limb and or damaged assets by far outstrips any perceived savings. Outside a plethora of OHSA and Environmental regulations, galvanizers also are compelled to do regular checks on the integrity of kettle walls. As with any production or manufacturing facility, orderliness and discipline is essential. Please stay safe everyone!

During the International Galvanizing conference in Italy, held in June 2022, the proposed changes to ISO the standard for batch type hot dip galvanizing were discussed. The ISO 1461 standard was subjected to minor amendments the revised edition was issued in July 2022. It is often overlooked that the standard and acceptance criterion for the hot dip galvanized coating reflects the corrosion control mechanisms, that is both barrier against the environment as well as cathodic protection of the carbon steel. With this in mind, the amendments are confined to changes in coating thickness for unreactive steels, the need for lesser cleaning in internal surfaces (internals are less exposed to external environments), expansion of certain definitions and in the appendices, updates on corrosion resistance using latest "loss" data. The Hot Dip Galvanizers Association of Southern Africa has representation with the South African Bureau of Standards on Technical Standards committee 107 and is in the process of aligning SANS121:2011 with the ISO 1461 standard.

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EDITORIAL COMMENT
in this issue

The fundamental need that corrosion control addresses are the longevity requirements of a design having a significant volume of steel as a core material. The longevity of the article or structure goes directly to the cost and the return on funds employed. Denis Waitley said "Most people rust out due to a lack of challenge. Few rust out due to overuse". The message is simple be proactive, be up to the challenge. In this issue

- We look to the application of hot dip galvanizing at the Vaal's Pennant Nine Yacht Club
- The thickness of coatings and the considerations of exceeding the standard requirements for coating thickness
- Knowledge and participation in the steel value chain and being an active participant
- Innovation and skills needed to help South Africa reach full solar generation potential
- Welds and welding of hot dip galvanizing

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COATING thicker than specified

Most people understand a greater zinc coating thickness will provide better corrosion protection performance to the base steel. However, they may not understand the limitations of the coating thickness. Somebody may ask you for a coating thickness over 85 microns thick without being aware of some important issues. As with many topics in the hot dip galvanizing industry, opening up the lines of communication and educating the customer is the best way to ensure satisfaction.

The chemistry of the steel can make it impractical

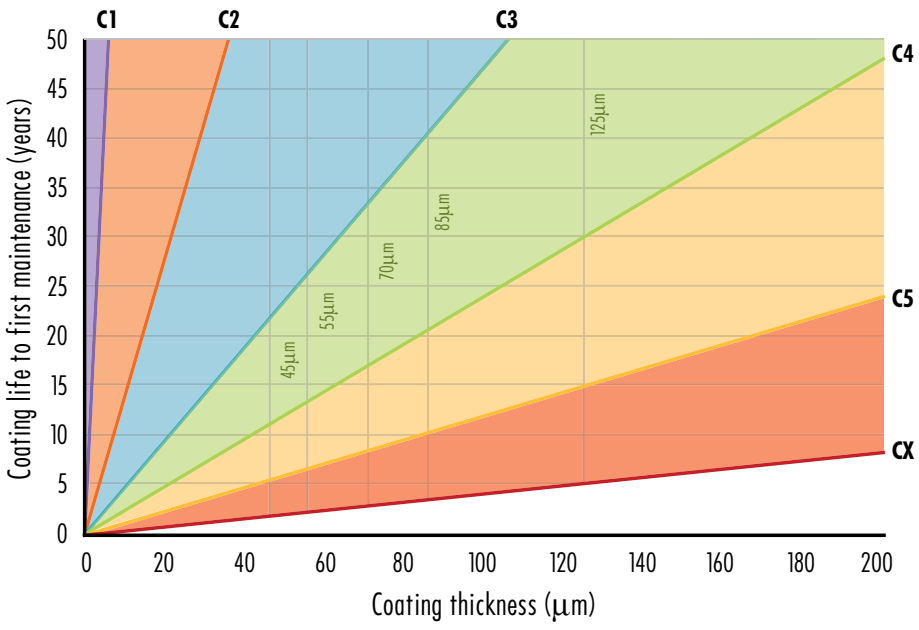
Some customers may want you to leave the steel in the zinc bath for a longer amount of time in order to produce an extra thick coating. This may be an option for reactive steels, where the thickness of the coating grows linearly with time. However, if the steel silicon and phosphorous levels are within the limits recommended by HDGASA the rate of the galvanized coating thickness growth will be parabolic with time, that is the growth will peak and then decline. After a short span of a quick growth rate, the thickness will grow much slower, making a much thicker coating impractical to achieve.

Susceptible to mechanical impact damage

Hot dip galvanized coatings that are too thick raise concerns about the brittleness of the coating. When an excessively thick (of 250µm or greater) coating cools after galvanizing, the stress between the steel and the zinc becomes great enough to strain the coating and induce flaking. The coating may fracture and chip off upon the application of an external force such as rough handling of the material. A coating thickness closer to those recommended in SANS 121:2011 (ISO1461:2009) will not be as susceptible to these conditions. This may be the most important reason a thicker coating is not always desirable.

A coating thickness near standard already provides adequate corrosion protection

Oft times the corrosion control by hot dip galvanizing of steel exceeds the design life of the structure itself. Even coatings near the specified thicknesses of SANS 121:2011 (ISO1461:2009) can provide upwards of 80 years of corrosion protection with zero maintenance in the appropriate atmospheric environment.



WELDING
and hot dip galvanized steel PART 2

Manual metal arc welding galvanized steel

Manual metal arc welding is recommended only for galvanized steel of 1.6mm thickness or thicker, as difficulty may occur with burning through on light gauges. GMA, GTA, or carbon arc welding are recommended for sheet lighter than 1.6mm.

In general, manual metal arc welding procedure for galvanized steel sheet is the same as for uncoated steel although the following points should be noted:

1. The welding electrode should be applied a little more slowly than usual with a whipping action which moves the electrode forward along the seam in the direction of progression and then back into the molten pool. All volatilisation of the galvanized coating should be complete before bead progress, after which welding is the same as for uncoated steel.
2. A short arc length is recommended for welding in all positions to give better control of the weld pool and to prevent either intermittent excess penetration or undercutting.
3. Slightly wider gaps up to 2.5mm are required in butt joints in order to give complete penetration.
4. For operator comfort, adequate ventilation must be provided, and the use of a respirator is recommended in confined spaces.
5. Grinding of edges prior to welding will satisfactorily reduce fuming from the galvanized coating. Welding schedules will then be the same for uncoated steel.
6. To restore the corrosion protection repairs to the coating must be carried out.

With metal recovery rates of between 110% and 130%, both rutile and basic

coated iron powder electrodes perform satisfactorily on galvanized steel, giving a good weld profile with freedom from undercutting, and easy slag removal.

In butt joints in plate with vee edge preparation, an electrode should be chosen which limits the tendency to produce a peaky or convex deposit run since this can cause slag entrapment which will not be removed by subsequent weld runs.

Undercutting in fillet welds is reduced if rutile coated electrodes with a less fluid slag are used since these produce a concave weld profile. Electrodes with very fluid slags tend to produce concave weld profiles with more prevalent undercutting, which is difficult for the welder to rectify.

Different brands of electrodes complying with the same specification may behave differently when used in welding galvanized steel and it may be advisable to carry out simple procedure tests before commencing production welding.

Extensive tensile, bend, radiographic and fatigue testing at the Welding Institute, Cambridge, England for International Lead Zinc Research Organisation has shown the properties of sound GMA welds and manual metal arc welds in galvanized steel to be equivalent to those of sound welds in uncoated steel. Test welds were made without removing the galvanized coating from edges to be welded.

The presence of any weld porosity due to volatilisation of the galvanized coating during welding has no effect on joint properties except in loss of fatigue strength which can be avoided.

GTA brazing galvanized steel

GTA (gas tungsten arc) process, also known as argon arc, provides an excellent heat source for braze welding.

In GTA brazing, the weld area is shielded from the atmosphere by a protective flow of inert argon gas. A non-consumable tungsten electrode is employed with a separate 96% Cu, 3% Si, 1% Mn filler wire, as used for carbon arc welding. The argon barrier prevents oxidation of the electrode or the weld pool and welds of excellent appearance result. The process allows continuous welding at very high speeds, particularly with mechanised arrangements.

In the GTA brazing of galvanized steel the arc should be played on the filler wire rather than on the weld area to prevent undue coating damage.

The following variations in welding technique are also recommended to minimise contamination of the tungsten

electrode by traces of zinc oxide fume:

1. Hold the weld torch at a 70° angle rather than the 80° angle normally used for uncoated steel.

2. Increase shielding gas flow from 6 to 12 l/min to flush zinc oxide fume from the electrode area.

Corrosion resistance of GTA brazed joints made in galvanized steel is excellent. During the welding operation the corrosion resistant brazed metal tends to wet and flow out over the small area from which the galvanized coating has been volatilised, so 'healing' the coating. GTA welding is recommended only as a heat source for brazing galvanized steel, not as a fusion welding technique. When used for fusion welding the tungsten electrode is fouled rapidly by zinc oxide fume.

Oxyacetylene Welding Galvanized Steel

Oxyacetylene welding galvanized steel sheet either with or without a filler rod is generally carried out on the lighter gauges. Because zinc volatilises at about 900°C while steel melts at about 1500°C, the necessary welding temperature usually results in coating damage and the need for subsequent treatment of damage areas.

Arc and oxyacetylene welding

In the arc welding or oxyacetylene welding of galvanized steel, provision must be made for control of welding fumes when planning procedures. Due to the relatively low melting point of zinc a proportion of the coating is volatilised and given off as a white zinc oxide fume. The presence of any fume evolved is obvious and this permits

simple observation of the efficiency of the ventilation or extraction system.

When welding is carried out in accordance with normal industrial practice with provision for adequate ventilation and air circulation, the non-toxic zinc fumes will cause no inconvenience. If adequate ventilation is not available, supplementary ventilation using air extraction equipment or forced air circulating equipment, should be provided.

Although welding fumes from galvanized steel are not toxic, operators welding in a confined space should always be provided with suitable respirators to minimise possible discomfort. Fume development and consequent coating damage may often be minimized with certain joint designs in flat sheet using copper chill bars. The chill bars are used as a backing strip or clamped on the weld side of the joint to absorb some of the heat generated during welding.

Brazing

Coating damage may be overcome by adopting brazing techniques. Brazing employs much lower temperatures (900°C), producing very little coating damage in the area adjacent to the weld. The weld metal itself is corrosion resistant and tends to wet and cover all bare steel in the weld area so that joints are normally acceptable without further treatment.

The suggested filler rod is a copper-zinc-silicon alloy. Prior to brazing, the edges of components should be painted for about 6mm back with a flux of Copper and Brass Flux.

The lowest practical heat input is desirable and flame adjustment must be oxidising, as this helps to reduce local loss of zinc in the weld zone. Butt welds are preferred to lap joints and the gap in such welds should be equal to half the thickness of the sheet.

Some welding fume will be given off during brazing and forced ventilation or fume extraction must be provided in confined spaces.

Refurbishing surface affected by welding / brazing

When severe damage to the galvanized coating has occurred during welding, protection of the steelwork must be restored. The level and extent of the restoration must be more robust and the repair work completed prior to the article being put in service if the steel will be exposed to severe corrosive conditions in service.

Source and acknowledgement: Sub-edited from and amended for Southern African context from GAA Published materials.

EMPLOYMENT EQUITY deregistration

THE HDGASA HAVE A WATCHING BRIEF ON LABOUR RELATIONS AND RELEVANT INSTANCES OF THE RELEVANT LAWS THAT APPLY IN SOUTH AFRICA FOR OUR GALVANIZING MEMBERSHIP. THE FOLLOWING INSTANCE WAS CONSIDERED VITAL TO OPERATING GALVANIZERS AT THIS TIME.

The Labour Court received an application from the Department of Employment & Labour (DEL) against a non-designated employer for failing to comply with certain sections of the Employment Equity Act (EEA).

In this application, the DEL requested the Labour Court to grant an order imposing fines upon the employer on two grounds:

- Its failure to report or inform the Director General (DG) of its inability to report due to its non-designated status, and
- Operating without an EE Plan during the inspection.

Each of these contraventions carried with it a maximum permissible fine of R1.5 million, meaning a total amount of R3 million was requested by the DEL to be imposed on the employer.

This employer has been a non-designated employer for several years but failed to inform the DG and failed to apply for deregistration from the EE public register, as they were required to have done at the time that the company became non-designated.

It is therefore of vital importance that employers comply with the law when they fall below the thresholds and become non-designated. They must inform the DG that they are no longer a designated employer and apply for deregistration from the EE register.

Thresholds for designated employers are shown in the table below.

Should a company fail to inform the DG of the change to non-designation status, the organization will still be deemed to be a designated employer and will have to comply with the relevant duties, until such time as they have informed the DG and received approval of deregistration. Failure to comply with the EEA may lead to serious fines being imposed on employers. The above was only one of several such cases, with the frequency only increasing as the DEL's enforcement becomes stricter with regard to EE compliance.

For the reasons outlined above, it is of utmost importance that deregistration applications be submitted immediately.

(1) Person who employs 50 employees or more -

(2) Person who employs less than 50 employees but has a total annual turnover equal to, or above the industry threshold in terms of Schedule 4 of the Employment Equity Act, listed hereunder:

Sector or subsector in accordance with the Standard Industrial Classification (SIC)	
Agriculture	R6m
Mining and Quarrying	R22,5m
Manufacturing	R30m
Electricity, Gas and Water	R30m
Construction	R15m
Retail and Motor Trade and Repair Services	R45m
Wholesale Trade, Commercial Agents and Allied Services	R75m
Catering, Accommodation and other Trade	R15m
Transport, Storage and Communications	R30m
Finance and Business Services	R30m
Community, Social and Personal Services	R15m

PENNANT NINE YACHT CLUB:
Hot dip galvanized floating jetty

THE NEED FOR A FLOATING JETTY AND MOORINGS AT THE PENNANT NINE YACHT CLUB (PNYC) AROSE WHEN MEMBERS WHO EITHER HAD TO MOOR THEIR YACHTS OFFSHORE AND TRAVEL SHIP TO SHORE BY DINGY OR DRY STORED AND LAUNCHED THEIR VESSELS INTERMITTENTLY WANTED A SIMPLER FRIENDLIER MOORING SYSTEM MAKING EMBARKING AND DISEMBARKING A BREEZE.

Above: Rod Rankin.

The Pennant Nine Yacht Club is on the shoreline of the Vaal Marina upstream from the confluence of the Vaal and Wilge rivers. PNYC is also the closest major yacht club to the town of Villiers. Three of the nine provinces border the PNYC viz Gauteng, Mpumalanga, and the Orange Freestate. The PNYC and this mooring are on the Gauteng side of the border. The atmospheric corrosion category according to SANS /ISO 9223 grades the zone as a C2/C3 environment. The many variables of this huge inland water reserve were all factored into the design. The water chemistry is of minor relevance to the design, as the designer intended the superstructure to be above the water level at all times.

The PNYC has experienced the highs and lows of this inland expanse of water being fickle to the varying rainfall in a 'water poor' country. In considering the design they referred back to their experiences over the years. Steel bridges and some floating platforms preceded the new jetty.

The ravages of corrosion were clear with under-creep corrosion having given rise to substrate corrosion. The fundamental application of oil-based paint directly on the steel structure. Even under moderate conditions, the paint started peeling within a very short time. Wood has a very limited lifespan and requires ongoing costly maintenance to ensure serviceability, not to mention the cost of labour and inconvenience of the ongoing work.

Hot dip galvanized steel was championed by Rod Rankine who has a wealth of experience in, amongst others, engineering solutions and corrosion control systems. The design is straightforward, with the floating pier linked by a gangway to a steel ramp on the shore. The floating jetty has smaller floating dock fingers perpendicular to the wider floating jetty for individual access to the moored vessel.

Installed circa 2000, the iterations of the design included a steel structure covered

in expanded metal and attached to the frame using TEK screws. The TEK screws were overcoated with grey paint to provide barrier protection.

The solution used on Rod Rankine's boarding floating finger and several modules of the jetty had the expanded metal welded in place prior to hot dip galvanizing. There resulted in a very low level of deformation of the expanded metal with no serious consequence to the functionality or aesthetic of the walkway surface. However, fixing the walkway mesh to the structural frames with mechanical fasteners is superior to welding as it obviates the lighter mesh buckling. Rod had plaques produced that provide an excellent explanation of the benefits of hot dip galvanizing of the steel design as the foremost solution for corrosion control.

Over the intervening years, since installation, the jetty and fingers have all acquired a dull grey patina and the zinc-iron alloys in the galvanized coating have provided for increased hardness on the walkway surface with no visible wear and tear.

Rodney Rankine said it best, "In the corrosion category we have here the hot dip galvanized jetty and fingers, which can be expected to provide an extended service life well in excess of any other coated steel frame design. See you again in a few years for the follow-up on the case study".

VENT FOR PEACE OF MIND –
Avoiding cracked welds on fabricated steel beams

Some weld fractures during hot dip galvanizing of steel beams were referred to the HDGASA for review and comment. The fractures occurred on lap joints at the intersection between the end plate and the angle.

The failures were rare with only two such incidents occurring which represent only 2% of all the structures galvanized, from the same fabricator, over several months.

The conditions that may contribute to a cracked weld are numerous. These may not be visually obvious. Examples include Heat-affected zones (HAZ), some weld materials, and induced stresses arising from variations in the thicknesses of plates welded. Furthermore, the entrapment of cleaning and pickling fluids through porous welds may also contribute to such a failure. This mechanism of failure is that on super-heating of the entrapped fluids during submersion in the kettle at a zinc temperature of 450°C a flash over to super-heated steam generates massive expansion forces within the weld area.

A stitch weld pattern would facilitate the drainage of the aforementioned fluids prior to dipping. The current recommendation for venting is to allow for a minimum 10mm diameter orifice. Considering welds, a stitch weld would be preferential and a gap approximating a similar cross-sectional area should be considered. The HDGASA design for hot dip galvanizing wallchart makes further recommendations relating the sizes of the vent gap to the internal volume of over-laps.

By adopting such simple fabrication techniques, it is anticipated that the risk of the client's component failure is substantially reduced. Of equal importance is the mitigation of the risk of damage and /or injury to the galvanizer's plant and personnel. This is in essence the purpose of the recommendations and prescripts aimed at addressing this fact in SANS / ISO 14713 Part 2.

OPINION PIECE:

INNOVATION AND SKILLS NEEDED to help South Africa reach full solar generation potential

By Viren Sookhun, Managing Director at Oxyon

SOUTH AFRICA'S POWER CRISIS IS NO SECRET, AND THIS, COUPLED WITH GLOBAL COMMITMENT TO TRANSITION TOWARD NET ZERO, AND THE CASE FOR THE TRANSITION TO RENEWABLE ENERGY, IS CLEAR. THE COUNTRY'S CLIMATE MAKES IT IDEAL FOR SOLAR, WITH AMONG THE HIGHEST AVERAGE HOURS OF SUNSHINE PER YEAR IN THE WORLD.

Above: Viren Sookhun, Managing Director at Oxyon.

Adding solar capacity to our energy mix is a matter of priority. However, there is a finite amount of open land available, and solar farms make this land unusable for any other purpose. We need to come up with innovative solutions to maximise our solar generation capability, and this requires specialised skills, which is where a Temporary Employment Services (TES) provider is perfectly positioned to assist.

The space problem

In terms of solar generation, there have been numerous solar farms and a lot of capacity installed, predominantly in the Northern Cape. In October 2022, Eskom signed a land lease agreement with four Independent Power Producers (IPPs) for them to produce 2000MW. These projects are expected to be up and running within the next 36 months.

However, what we have also seen is that in Bid Window 5 and Bid Window 6, solar is getting a lower allocation than wind, partly because of the sheer amount of real estate needed for a large-generation solar farm. This land will be tied up for the life of the farm, which is up to 25 years, and cannot be used for other purposes, including agriculture.

Thinking higher

The reality is that we do not have sufficient open land to power our electricity needs through solar farms, so we need to start thinking more innovatively. If we take solar generation to a higher level, for example commercial and residential rooftops, there is a massive amount of real estate that we can leverage. This can be used for embedded generation as well as be fed back into the national grid.

In addition, if we cover the large open parking lots that are abundant throughout the country at malls, office parks and city centres with awnings, this space can

also be used for the installation of solar panels. From a residential perspective, if we make solar more affordable and attractive through new financing models, tax incentives and rebates, more homes will be able to produce their own power and feed excess back into the grid.

Innovation is vital

Aside from the traditional purchase arrangement for residential solar, another model could prove highly attractive. In this approach, IPPs or renewables companies do the installation, lease the space from the homeowner in return for a capped amount of electricity, and then wheel the balance back to Eskom.

We could even take this a step further and install wind generation on top of the solar farms on rooftops, adding another element to the capacity generation without increasing the need for more land to be tied up in power generation. A software application can be developed to facilitate where property owners can list their rooftops or land for lease and where IPPs, Engineering Procurement Construction companies (EPCs) and rooftop solar or wind installers can 'buy' that space to generate electricity.

The right mix of flexibility and skills

Instead of leasing land and taking up space, we can make use of real estate that is already being used for other purposes. This also opens up solar generation to the Small, Medium and Micro Enterprise (SMME) market to assist IPPs with installations and maintenance. In turn, this creates employment opportunities, but since they are project based, permanent employment is not the answer.

A TES provider can deliver the flexible workforce required to meet fluctuating demand and scale up for new projects, while ensuring that all staff have the relevant skills and experience for the job. A reputable TES partner will also ensure that the essential health and safety component is taken care of, including certifications for working at heights and the correct safety harnessing and equipment. A TES provider has the expert understanding of Occupational Health and Safety (OHS) and will provide training and upskilling when required. They are able to offer a one stop shop service for both smaller business and start-ups as well as at scale, facilitating the rapid deployment of new solar power generation capability.

A view to the future

The reality we face is that we need new ways of generating power, but we also need to ensure that we have sustainable solutions for the future of the country. Using up all of our free land for solar farms is not a viable long-term answer, so we need to look to innovative solutions to solve our power crisis. Changing the way we approach power now will help to mitigate our energy crisis, move us forward in terms of reducing carbon emissions, and create employment, all of which are essential for a sustainable future.

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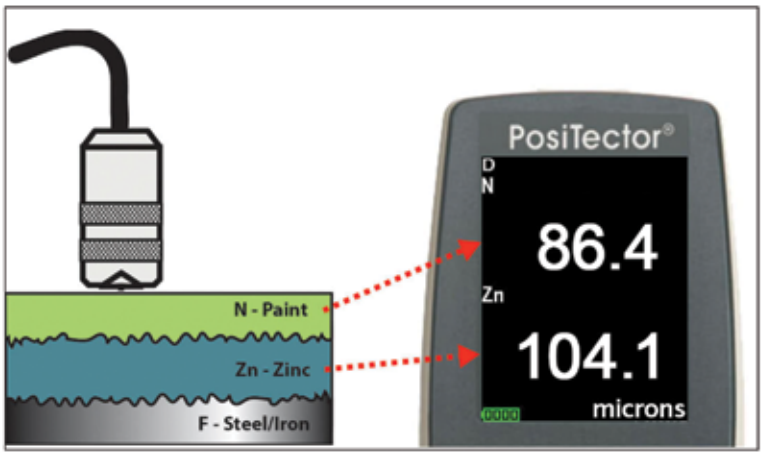

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DeFelsko has also launched their own software, PosiSoft Desktop. PosiSoft is also free for download from the DeFelsko website. This powerful yet simple software makes it easy for the user to import readings directly from the gauge/smart phone/smart device via USB.

DeFelsko CorporationDeFelsko Corporation, a leading U.S. Manufacturer of coating thickness gages and inspection instruments, has been delivering Simple, Durable and Accurate gages since 1965.

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ENGINEERS AND THE SAISC:
Bolstering the two-way street

1

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With access to over 60 years' worth of local steel industry project case studies and an impressive number of experienced and highly-qualified team members, the SAISC stands as the custodian of steel industry knowledge and standards in Southern Africa.

"The Institute is highly respected for its reservoir of authoritative technical knowledge, and is, in fact, one of only 6 Institutes of its kind in the world," clarifies Gebremeskel.

"As such, we are able to consult with engineers, specifiers, and architects on design recommendations and offer experienced technical input. We have many resources that local engineers are already accessing. However, by becoming members of the Institute, they have access to even more – and to our targeted guidance and mentorship - as required. We would also encourage engineers to work with fabricators who are members of the SAISC as knowledgeable and up-to-date steel specialists.

The SAISC is a stalwart of the steel industry which also provides popular technical publications for sale, a broad range of relevant training, and advisory services including technical queries relating to steel construction and structural engineering.

Sharing knowledge for the benefit of all in the steel value chain

The Southern African Institute of Steel Construction (SAISC) has positioned itself to service the steel construction industry, and individuals, including engineers, are involved with and interested in steel construction. The Institute is able to offer engineers the value of the knowledge it is able to share. Amanuel Gebremeskel, Chief Executive Officer of the SAISC, explains: "It is a universal truth that having access to information does not necessarily mean having access to knowledge. In this regard, the world can often be seen to be 'information rich but knowledge poor. Knowledge however comes through an understanding and application of the information. The SAISC provides a means to stakeholders of processing and understanding pertinent information and making it available as the knowledge that is easily understood and to is constructively used."

Refocusing: the importance of sharing knowledge

Gebremeskel explains that since its inception, the SAISC has been able to play different roles across the industry, at different times. We have noted a need to return our attention and efforts back to the Institute's original core purpose: namely, the sharing of knowledge. The SAISC encourages future engineer members to share their knowledge through the SAISC's technical talks and training opportunities. Furthermore, providing individual mentoring of young engineering student members thereby establishing a 'two-way street' for the greater development, empowerment, and benefit of all role players within the local steel value chain.

Toward a holistic membership pool

Denise Sherman, SAISC Marketing and Management Consultant, agrees, adding: "Over time, we have noted that many engineers make use of the SAISC resources. We would like to encourage them to become members of the Institute in order to be able to tap into an even richer fabric of available knowledge and have open access to all relevant role players throughout the local steel value chain."

1 SAISC Chief Executive Officer.

2 SAISC Marketing and Management Consultant.

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INSPIRING SAISC STEEL AWARDS 2022

South African steel construction sector triumphs over adversity of recent years

1 Benguela General Treatment Plant.

Innovation, ingenuity and a sense of community within the steel construction industry were showcased on the evening of 13 October, when participants across the local steel value chain gathered to attend the highlight of the annual steel industry calendar – the 2022 Steel Awards, presented by the Southern African Institute for Steel Construction (SAISC) and held at Emperor's Palace, Gauteng.

This event, which demonstrates excellence in the use of steel in construction, was the first in-person Steel Awards held since 2019, prior to the Covid-19 pandemic. The 2022 Awards very effectively highlighted how the local steel sector has triumphed over adversity in the past two years; as well as showcasing a typically South African 'can-do' approach to the challenges endured during this time.

The annual SAISC Steel Awards provide an opportunity for stakeholders across the industry – including engineers, fabricators, designers, architects, processors, merchants and fabricators - to present their work and be honoured for their outstanding achievements. The evening – known in the steel sector as the 'Oscars of the steel industry' – was an elegant gala-style gathering with a 'red carpet' feel and a growth-related theme this year of 'green shoots'.

Local ingenuity and commendable perseverance

SAISC CEO Amanuel Gebremeskel explains: "Even before the global pandemic, South Africa's steel industry had gone through a period of severe challenges. The 'green shoots' theme is an acknowledgement of the importance of continuing to navigate through troubled times. It is also a tribute to our

much-loved former CEO, the late Paolo Trinchero, who did so much for South Africa's steel industry.

He was a passionate proponent of the concept of promoting growth throughout the steel sector – or 'green shoots' as he put it – and that one must keep on moving forward and pushing through, even when times are tough. I know he would have been so proud of this year's entries, which are even more noteworthy because they were completed during this very difficult pandemic era."

Gebremeskel explains that many steel construction projects globally were stalled during the Covid pandemic, and yet members of the South African steel industry managed to drive projects through to completion.

"A number of high-quality, truly excellent projects have been showcased at this year's annual Steel Awards, and I believe this is a testimony to our character as a nation - as well as the value which the SAISC brings to the local steel construction industry. The SAISC is one of only 6 steel institutes around the world, and has a long history as a 'steel sector sage': a custodian of technical knowledge, an educational resource and a trusted authority."

Mining category 'gem' shines as Overall Awards Winner

"While there is tremendous merit across all of our entrants, as well as all our category winners," enthuses Gebremeskel, "the SAISC Annual Awards judges were unanimous in their praise of our overall winner – which was also the winner of the Mining Category – the Benguela General Treatment Plant mining facility, aboard the 'Benguela Gem', the world's most advanced diamond recovery vessel. The Benguela Gem is owned by Debmarine Namibia, a 50/50 joint venture between De Beers Group and the government of the Republic of Namibia."

The Benguela Gem is the product of international collaboration: designed in Norway and Poland, built in Romania and fitted out by De Beers Marine South

2 House Vingos.

Africa. Diamond recovery by Debmarine Namibia takes place at 90 to 150 metres below sea level. The exceptional design, fabrication and installation of the 3000 ton diamond treatment plant on the vessel was carried out ahead of schedule by local engineers and fabricators in the midst of Covid-19 pandemic restrictions.

Gebremeskel advises: "This project stood out in a number of different ways, and presented a first in the history of the Steel Awards: it operates off-shore, and is floating rather than being stationary and anchored – a truly distinctive applicant within the Awards categories. As a sea-faring structure, it is furthermore subject to unusual engineering loads from a naval engineering perspective.

The vessel, built for De Beers Marine operations, is unique in Africa, being able to carry out the entire under-sea diamond dredging and treatment process.

From the vessel arriving at the end of September 2021 with an empty deck, it sailed again in December 2021 with a fully operational mine onboard.

This project was an exceptional showcase of the use and applications of steel featuring South African design, fabrication and construction for an international client."

2 The treatment plant was nominated by designers PBA Projects and completed in collaboration with De Beers Marine and 3C Metal Belmet, Namibia and local fabricators Steel Services and Allied Industries.

Additional award categories showcase steel sector diversity

This year's awards introduced more categories, and consequently an increased number of winning entries, than in recent years. SAISC Marketing and Management Consultant Denise Sherman explains: "The reasoning behind this was to honour a broader spectrum of Awards entrants. We wanted to cater to all possible role-players within the steel construction industry's varied landscape."

The Steel Awards category winners are as follows:

Automotive

Ford Package E – As part of a R3-billion investment by vehicle manufacturer Ford, an automotive assembly plant was erected in Rosslyn, Pretoria as part of the company's high-volume export programme. The project used extensive steel supplies and comprised a 12 400m² warehouse, 14.6m in height. The project was completed ahead of schedule, despite the Covid-19 pandemic and related supply challenges.

Agri-Industrial

Woodridge Packhouse – This project presents an interesting form, clever use of natural light and a design which allows for natural ventilation – therefore saving on energy costs.

Mining

Benguela Gem Treatment Plant – This project not only won the Mining category but the 2022 Steel Awards overall.

Residential

House Vingos – The innovative use of steel – combined with all the other elements of construction – delivers a statement piece of architecture and a warm, welcoming family home.

Sports Facilities

KES Aquatic Centre – While retaining the heritage component of the previous swimming pool complex, the roof structure is of particular interest: an apex running diagonally across the structure, requiring meticulous attention to ensure leakproof sealing.

Sculptural / Architectural

Eastgate Solar Trees – In addition to their aesthetically-pleasing design and how this cleverly reflects a renewable energy focus, the access to the site during the construction phase was challenging, making for a complicated and challenging installation process.

Light Steel Frame (LSF) Building

Jubilee Hospital – At the height of the Covid-19 pandemic, the innovative use of light steel framing in this field hospital in Hammanskraal, north of Pretoria, allowed for the addition of a significant number of hospital beds to increase existing capacity, using this speedy construction methodology.

Metal Cladding and Roofing

KES Aquatic Centre – This project won both the Metal Cladding and Roofing, and the Sports Facilities categories.

Tubular Steel

Babanango Travellers Camp – This innovative tourist accommodation is situated within the Babanango game reserve in northern KwaZulu-Natal. A number of interesting technical details included reconciling complex issues regarding the use of different materials of construction and geometrical factors, to achieve the project's architectural objective: roofing reflecting shapes used in traditional African shields.

Community Enrichment

Gary Kirsten Sports Centre Khayelitsha – Featuring ease of construction and sustainable materials, this structure also has the capacity to extend if need be.

Regional Awards

- Best Project Gauteng – *House Vingos*
- Best Project Western Cape – *Benguela Gem Treatment Plant*
- Best Project Eastern Cape – *Woodridge Packhouse*
- Best Project Limpopo – *Freshmark Polokwane*
- Best Project KwaZulu-Natal – *Babanango Travellers Camp*
- Best Export Project – *New Biox Plant in Zimbabwe*

Best Project Limpopo: The project, carried out for the Freshmark distribution centre in Polokwane, made use of particularly innovative cladding: atypical of a warehouse building, and technically challenging to achieve. The result was aesthetically pleasing, with a design element of curved bullnoses from roof to cladding.

Best Export Project: Biological oxidation ('Biox') is a technology that ensures the optimal processing of high sulphur gold

3 Ford Package E.

ore, thereby increasing the achievable gold recovery. This technically challenging structural framing project entailed detailing, fabricating and constructing a gold processing Biox plant. The primary objective thereof was to provide access to the various areas of the Biox plant – and to its piping support system.

Focus on in-person networking

Sherman adds that the 2022 Steel Awards were extremely well-attended. "In fact, this was one of the largest Awards held at a single event in recent years," she enthuses.

"In contrast to our Awards of 2020 – which of necessity took place purely online – and our Awards of 2019, which were held across 3 venues simultaneously – namely Johannesburg, Cape Town and Durban – the 2022 Steel Awards were planned from inception to take place at a single venue. This was to highlight the event's in-person networking opportunities – and emphasise the value that the constructive use of steel brings to communities and lives."

Grateful thanks to sponsors

"The SAISC is extremely grateful to its sponsors, who have made the event possible through their generous sponsorships. We would like to thank Safal Steel, Bolt and Engineering, BSi Steel, ProRoof, NJR Steel, Macsteel, Safintra South Africa, Global Roofing Solutions, Unica Iron and Steel, ASTPM, and Stewarts & Lloyds," says Gebremeskel.

"In addition, I would like to thank all the other role-players involved in putting these awards together, including the judges; Denise Sherman, our Marketing and Management Consultant; the members of the board; and all our members from outside Gauteng who have travelled to attend the Awards at their own expense. All those who have volunteered so much of their time to ensure the success of Steel Awards 2022 are indeed greatly appreciated!"

"It is wonderful for the SAISC to have been able to host the Steel Awards in-person once again, and to see the spirit of triumph over adversity soaring high – like the steel structures of so many of our notable entries – throughout the local steel and construction industries.

I believe the Institute – together with our valued Steel Awards entrants, sponsors, members and partners – has proven once again how much can be achieved across the local steel value chain when all players persevere for the continued success and sustainability of the steel industry," he concludes.

About the South African Institute of Steel Construction (SAISC)

Founded in 1956, the South African Institute of Steel Construction (SAISC) represents all facets of the steel construction industry – as well as those with an interest in the use of steel in all sectors of business and society as a whole. The mission of the SAISC is also to promote the holistic vigour and prosperity of the people and companies in South Africa that provide steel-related products or services to the construction and related industries.

SAISC members include the steel mills, merchants and value-added processors and service centres, steelwork contractors, companies that provide services (such as fabrication, galvanising or painting); or products such as fasteners, paint and a variety of other products, client bodies, architects, specifiers, consulting engineers, project managers, quantity surveyors, engineering procurement and contract management contractors and assorted others.

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