# steel CONSTRUCTION

Volume 36 No. 1 2012

**IN THIS ISSUE:**

Exposed architectural steelwork

SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION

OFFICIAL JOURNAL OF THE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION


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# EDITOR'S NOTE

It is only the beginning of 2012 and already I have to make use of other people's ideas to fill this tiny column. But I thought a bit of humour would be a good idea to start the last year of our existence according to the Mayans.

Here are a few predictions made by famous and clever people who are still suffering from foot-in-mouth-disease (hopefully we can add the Mayans to the list in 2013):

*"640K ought to be enough for anybody." – Bill Gates, 1981.*

*"We don't like their sound, and guitar music is on the way out." – Decca Recording Co. rejecting the Beatles, 1962.*

*"But what... is it good for?" – Engineer at the Advanced Computing Systems Division of IBM, 1968, commenting on the microchip.*

*"That virus is a pussycat." – Dr. Peter Duesberg, molecular-biology professor at U.C. Berkeley, on HIV, 1988.*

*"I think there is a world market for maybe five computers." – Thomas Watson, chairman of IBM, 1943.*

*"No, thank you." – The first of several agents who rejected J.K. Rowling's first Harry Potter book*

Suppose one should be careful of making statements about the impossible.

I can think that there might have been a few engineers in history who looked at an architect's drawings and said: "It cannot be done!" but in the end made it work.

In this issue we look at beautiful structures designed by architects who used exposed steelwork as well as a very interesting article on the 2010 stadiums written by an architect.

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***The Steel Construction journal supports the freedom of media and speech implicitly enshrined in our Constitution (Article 16).***

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**Front Cover:** Tom Kundig - Chicken Point Cabin
Photo: Benjamin Benschneider

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# SAISC COMMENT

By Dr Hennie de Clercq,
Executive Director, SAISC

*I submit that if one looks at the state of the world economy today, and particularly at the economies of the West, there is no reason to regard the current rules of trade as something sacrosanct that has to be upheld at all cost. In fact, I believe that any country that does not do whatever it can to prevent any one of its established industries from withering or dying is behaving very foolishly.*

## WHAT IS GOOD FOR OUR INDUSTRY IS GOOD FOR OUR COUNTRY

The Institute has played an active and prominent role in the process that led to the Minister of Trade and Industry declaring transmission line pylons a 'designated product' (see the full article on p12), which means that all entities associated with government will in future be constrained to procure pylons from local producers. Previously we announced that we had convinced the authorities to impose a 15% import levy on pylon steelwork. At present we are striving to have the 15% levy which is already in place rigorously enforced. We are also working on having more structural steelwork declared as 'designated products', and on combating the tendency among some officials to grant import permits for projects too readily without due consideration of local content.

We are clearly committed to protecting our industry against competition from abroad. We don't want to see the steel industry in South Africa decline. And the multiplier study we did showed us that what is good for our industry is good for our country. Every ton of structural steelwork that is fabricated here creates jobs and economic activity, not only in our industry but with steel merchants and mills and ore mines and everybody who supplies products and services to these industries. And everyone who earns a salary in any of these companies spends it on housing, clothes, food, school fees and a host of other things, in a cascade of delivering livelihoods to people. Finally, at least R0.35 for each R1.00 earned by our industry lands in the pocket of government by way of some or other form of tax. Import the steelwork and all the benefits accrue to the other country.

And yet, despite the obvious good that comes from not importing, the DTI is not in the habit of smiling gleefully when you approach them for protection. It is clear that they are not only concerned about any penalties that may result from breaking any of the rules associated with the international treaties our country has signed; they clearly believe in the dogma of free trade underlying these rules.

As I understand the argument behind globalisation and free trade it is that if one leaves it to the market to sort out who produces what and what the price will be, the whole system will settle down to a point where everything is produced in those areas where it can be done most efficiently and at prices as competitive as you can get. This will result in the most efficient international system and everybody will be as well off as you can get.

But what the authors of the dogma forgot is an old habit of humankind: as soon as there's a set of rules people will try to outwit them or turn them to their own favour. The clever guys often succeed, and having both muscle and brains helps.

For a country like China the WTO rules came like manna from heaven. They were the only country with the size, political will, insight and degree of centralised control to be able to pin their currency at a hugely export-friendly level while keeping the expectations of workers on all levels in check. Furthermore, their savings rate and their freedom from many of the rules of capitalism allowed them to invest heavily in infrastructure and productive capacity and to subsidise exports in ways outsiders find hard to understand.

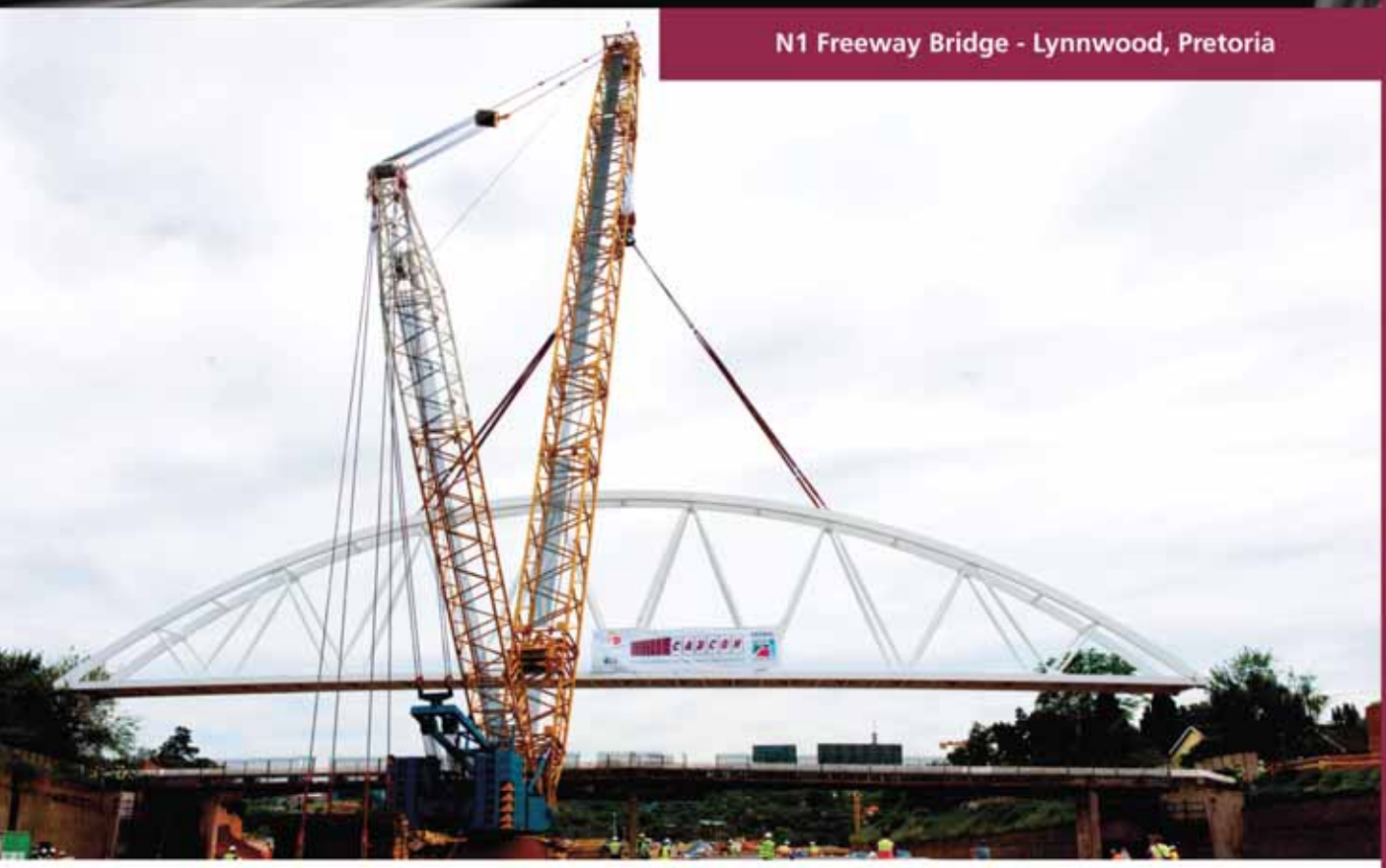
The result is that many industries in many countries are threatened. Some are dead. Economists and politicians in Western countries seemed to think this was a good thing and they boasted of being 'post-industrial'; they had moved on to more intelligent things; they earn their money with their brains now, no longer with their hands.

I submit that if one looks at the state of the world economy today, and particularly at the economies of the West, there is no reason to regard the current rules of trade as something sacrosanct that has to be upheld at all cost. In fact, I believe that any country that does not do whatever it can to prevent any one of its established industries from withering or dying is behaving very foolishly.

So I think that the efforts of the SAISC to preserve and build the steel construction industry in South Africa are good for the country, like they are good for everybody who makes a living from this industry, directly or indirectly. If anything, we should be more aggressive in pursuit of the use of products made in South Africa, rather than less so.

# CADCON

STEEL CONSTRUCTION AND ENGINEERING



N1 Freeway Bridge - Lynnwood, Pretoria

Established in 1987, Cadcon, as a vibrant and reputable entity, has grown into a leading steel construction, designing and engineering organization involved in major projects in and around Southern Africa and internationally. Cadcon operates from their 15 400 m² workshop and office facilities in Centurion, Pretoria, housing state of the art machinery and latest technology CNC plate, beam, angle, cutting, drill and saw facilities serviced by 20 overhead cranes. Cadcon has also implemented the FabTrol System providing drawing management, material nesting, purchasing, inventory control, production and CNC management, shipping and more.

Medupi ACC JV for ESKOM, Ellisras

Mbombela FIFA Stadium JV, Nelspruit

Planning and completion of various significant and complex national and international projects on time, for commercial, industrial, mining and plant sectors, serves as testimony putting Cadcon as a leader at the cutting edge, in a rapidly growing and competitive environment. Cadcon has valuable experience in exports of steel products internationally and strong innovative contributions to the whole of Southern Africa.

Furthermore, Cadcon's unique packages include the design and supply of buildings through Mictec, Cadcon's in-house engineering design department. Additional services include crane, truck and trailer hire.

Cadcon operates their full production process from the delivery of raw material, fabrication, abrasive blasting, corrosion protection, erection and finishing to the proud delivery of the final product through their team of graduates and dedicated artisans. Cadcon's methodologies and processes results in their ability to provide their clients with turnkey solutions at optimum efficiency; **STRIVING FOR EXCELLENCE AND PEACE OF MIND IN STEEL CONSTRUCTION**, this being the cornerstone of Cadcon's success and competency.

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# VISITING ARCHITECT 2011: TOM KUNDIG

*"As I was developing an architectural voice, I realised there was something similar about buildings that I found fascinating: that buildings could be changed by people using them. You can literally move walls or furniture and move it on a scale that reminds you that you're capable –with geometry and physics – of moving these things."*

For some 13 years now the Institute and the Department of Architecture at the University of the Free State has collaborated to bring a prominent architect from somewhere in the world to South Africa.

Our visitor in 2011 was a very well known American architect, Tom Kundig, who has done remarkable projects in many countries, using steel to great effect. Having such a person sing the praises of steel as 'green', 'beautiful', etc. amounts to advertisement money can't pay for.

## BIOGRAPHY

Tom Kundig is one of the most recognised architects in North America. He has received some of the country's highest design awards, including (and these are only a couple of them among of many) a National Design Award in Architecture Design from the Smithsonian Cooper-Hewitt National Design Museum; four National AIA Honor Awards; six National AIA Housing Awards; and an Academy Award in Architecture from the American Academy of Arts and Letters. In 2011, he was included in The Wallpaper* 150, Wallpaper* magazine's list of the 150 people who have most influenced, inspired and improved the way we live, work and travel over the last 15 years. Numerous books have also been published on Tom's work.

Kundig's work encompasses residential, commercial and institutional and is located around the world. His signature detailing and raw, kinetic construction explore new forms of engagement with site and landscape, which he frames in the workings of unique, building-size machines. In his houses, which are quickly becoming recognised as modern-day classics, brute strength and tactile refinement are held in perfect equilibrium.

Recent and current projects include the mixed-use Art Stable and 1111 E. Pike, Le Massif de Charlevoix master plan, a gravity-fed winery in the Naramata Bench of British Columbia, adaptive reuse of the Georgetown Brewing Company and Nissan Stadium Seattle, the Rolling Huts and private residences in Spain and throughout North America, including the Pierre, Shadowboxx, Studio Sitges and Outpost.

Kundig regularly serves on design juries and lectures around the world on architecture and design. He has been a university studio critic throughout the United States and in Japan.

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## OLSON KUNDIG ARCHITECTS

Olson Kundig Architects began its creative existence with architect Jim Olson, whose work in the late 1960s explored the relationship between dwellings and the landscape they inhabit in the Northwest. Olson started the firm based on some simple ideas: that buildings can serve as a bridge between nature, culture and people, and that inspiring surroundings have a positive effect on people's lives. Rick Sundberg joined the firm in 1975, and its commitment to urbanism and civic life became evident as they began designing and developing modern urban buildings in and around Seattle's national historic districts Pike Place Market and Pioneer Square.

In 1996, Tom Kundig joined Olson and Sundberg as an owner, taking the firm to another level of creative exploration and helping it grow into an office with an international reputation.

The firm now numbers over 80 employees. The office combines the capacity of a large firm with the intensity of a small one. The firm's commitment to vigorous, critical design review sessions has infused its designers with a shared sense of commitment to every project.

Among the firm's accolades are the numerous awards, published books, as well as articles and covers for magazines.

# TOM ON...

## SMALL HOUSES IN BIG LANDSCAPES

I don't know that I necessarily specialise in small houses in big landscapes but I certainly like them. I find inspiration in a lot of things but am particularly influenced by nature and how people respond to it. I think small structures in big landscapes remind us of our place in the natural order of things...that we are part of a larger system. Small buildings encourage their users to engage with the world at large.

## HIS FASCINATION WITH 'GIZMOS' AND GADGETS

When I was a kid, I grew up amongst industry: mining, logging, farming. Naturally, with that there was a lot of machinery, a lot of practically-designed – and in its way, beautiful – machinery. And when I lived in Alaska, I would go way out in the country, hiking and mountain climbing, and I would see these pieces of machinery way the heck back there, powered by wind or by water coming off the side of a mountain. The guys who designed these were geniuses! As I was developing an architectural voice, I realised there was something similar about buildings that I found fascinating: that buildings could be changed by people using them. You can literally move walls or furniture and move it on a scale that reminds you that, in fact, you're capable –with geometry and physics– of moving these things.

## HIS APPROACH TO A SITE

For me, the site is sacred. I like to spend time walking the site and getting to know it. The goal for the architecture is to help reveal and unfold the site, to frame the site and its aspect.

## CONCRETE AND STEEL – HOW THESE MATERIALS RELATE TO THE SITE

If you start with the belief in the primacy of the site, material choices become a direct response to that particular place. I think it is important not to compete with the landscape and to acknowledge the place of architecture within the larger space.

## THE IMPACT OF THE MODERNISTS ON HIS ARCHITECTURE

Early in my career, I made a trip to Le Corbusier's chapel at Ronchamp. It was an emotional and visceral experience for me. Everything worked. There was invention and even humour in the building- one of the scuppers looked to me like a pig's snout. Every time I see Pierre Chareau's Maison de Verre in Paris, I come away inspired. There's true serendipity in the design and the levers and pulleys that control the windows. I feel the same way about Carlo Scarpa and Glenn Murcutt's buildings. All these buildings are at the intersection of the rational and the poetic...that's where great architecture happens.

# HENNIE COMMENTS ON A FEW OF TOM KUNDIG'S PROJECTS

Photo: Tim Bies/Olson Kundig Architects

### Delta Shelter

A cabin with only 100m² of floor space in the icy wastes of Washington State in winter. The sides can be opened, allowing the owners to experience being part of the forest winter or summer, or fully closed up to yield a cosy environment.

Photo: Benjamin Benschneider

### Art Stable

A mixed-use building with street level retail and living units above. The large windows opening out over the street on each level are hinged on a column on the outside of the building, running the full height. The building reflects a feature of many of his buildings: unpainted, normal steel. "I find Cor-Ten a bit on the expensive side", he says, "and I get the same results with normal mild steel. Corrosion is not a serious problem in areas of low corrosivity."

Photo: Benjamin Benschneider

### Olson Kundig Architects Office

The roof light in the offices of Kundig's practice weighs about 3.5 tons and is operated by a source of power we have in abundance around us but seldom recognise: normal city water pressure! The mechanism with the two small wheels to the left of the middle of the picture was taken from old hydraulic applications, and serve to prevent two valves being open at the same time. The hydraulics allows the heavy window to be open and closed with exquisite control.

Photo: Benjamin Benschneider

**Chicken Point Cabin**

Like many of Kundig's buildings, this one also has a 'contraption' – a piece that is mobile and makes the building adjustable to the seasons and the user's mood. And the mechanism on the right can be operated by a four year old child. Swinging this window away brings an ambience and a sense of space that would be hard to emulate. No wonder the idea has since been often emulated!

Photo: Tim Bies/Olson Kundig Architects

**False Bay Writers Retreat**

A Kundig house can hardly get away without having something that moves. Flipping the decks up serves to secure this weekend refuge when the owners are not at home, but it can also cause this open nest to be transformed into a warm cave.

# INDUSTRY NEWS IN BRIEF

## CADCON ON ISO 3834 ROLL

**SAISC member**

Cadcon Steel Construction and Engineering is the latest prestigious organisation to be accredited to the ISO 3834 standard via the SAIW Welding Fabricators Certification Scheme. This brings to well over 30 companies that have been accredited through the scheme with more than that number in the process of being accredited.

SAIW's technical services manager, Sean Blake, says that having companies like Cadcon on the 'accreditation roll' does a lot to promote the scheme. "Cadcon is a thoroughly professional organisation and is a role model for many fabricators in South Africa. By becoming accredited they have given an important endorsement for how important the scheme is for companies that wish to remain competitive both locally and abroad," Blake says.

Cadcon director Barry Barnard was just as enthusiastic. "We are delighted to have received ISO 3834 accreditation. Firstly, an increasing number of our customers are demanding that ISO 3834 accreditation and, secondly, it was pleasing to know that we are, by objective standards, as professional as we always thought we were. This is most encouraging," Barnard says.

He adds that the whole process was run efficiently and professionally. "The SAIW lived up to their reputation as one of the top welding institutes in the world. They are not only efficient but their knowledge levels are superb."

*Interested in ISO 3834 Accreditation? Phone Sean Blake On 011 298 2100.*

## FIRST CUT: MAXIMISING PRODUCTIVITY: NEW ROTATOR BOOSTS GENREC'S PRODUCTION LINE CAPABILITY

**Steel Awards 2011 – Partner Sponsor**

Genrec is enjoying a significant boost in productivity and efficiency levels since installing a rotator from Strieli-Bieger.

Mike Borello, Operations Executive at Genrec credits First Cut (Pty) Ltd for identifying the right solution in the Strieli rotator and facilitating a smooth installation.

Medupi ACC Ducting Support Unit in fabrication at Cadcon, with temporary spiders for stability during welding execution.

Mike Borello, Operations Executive at Genrec.

Borello explains that Genrec, the engineering division and a wholly-owned subsidiary of Murray & Roberts, had been experiencing productivity-related challenges in their assembly and welding process. The company's main focus, currently, is the fabrication of structural steel for Eskom's two new power stations, Kusile and Medupi.

"The scale of these contracts has meant that our focus has changed from 'jobbing' to a more dedicated production line, which includes the moving and handling of large quantities of steel at high speeds," says Borello. Because both sides of the steel needed to be welded, there were delays in the moving and handling of the piece of steel.

"First Cut, with whom we have been doing business through their consumables division, provided us with the technical information on the Stierli rotator, and it seemed to tick all the right boxes," says Borello.

Steve Van Wyk, Capital Equipment Director at First Cut, explains that Swiss-based Strieli's special rotating equipment can be used for welding, painting or assembling. "The load capacity of the Rotator 1000 is

# INDUSTRY NEWS

12 ton/pair and allows for effortless and safe rotation of large and cumbersome constructions. The rotating equipment is fast-turning and allows for efficient welding and visual inspection in every possible position," he says.

Other benefits of the Strieli rotator include safety and reliability, according to Van Wyk. "The machine is fail-safe in term of safety, as it self-locks when stopped. This is important as safety is paramount for our client," he comments.

"Having a local agent in First Cut has proved critical to the success of this project," Borello asserts. "We have had experience in the past of dealing with overseas suppliers, with broken English on the phone, trying to fix a problem."

## VOORTMAN ACQUIRES GERMAN 'MASCHINENFABRIK BACH'

**SAISC member**

The Dutch steel machinery manufacturer Voortman from Rijssen announced the acquisition of Maschinenfabrik Bach GmbH (Apolda, Germany) in November last year. The new subsidiary of the Voortman Steel Group will be operating under the name Bach Cutting Systems GmbH.

The acquisition combines years of experience and expertise from both companies. Bach has over 65 years of experience as a manufacturer of cutting systems for oxy-fuel and plasma cutting of steel plates and is a well-known supplier of these systems both in Germany and internationally.

Voortman has developed over more than 40 years to be a single source supplier of CNC-controlled machinery for the steel processing industry. Over the last few years Voortman has seen major growth in the company and the market. This growth is due to the high reliability and quality of the machines and the many innovations in the field of production-automation, which Voortman constantly develops.

Mark Voortman, CEO of Voortman: "The acquisition of Bach provides us with many opportunities in the field of sheet metal. Through the acquisition we enter new markets that were unfamiliar to us. We obviously could invest in the development of new machines, but through the acquisition we gain experienced professionals, new customers and relationships."

Production of the cutting systems for oxy-fuel and plasma cutting will persist in the German Apolda, where the head office of Bach Cutting Systems is located. The cutting systems of Bach can be equipped with several cutting torches for optimal batch production. For bevelling, the systems will be provided with 3D-torches. Optional, cutting pipe material is also possible.

## PEDDINGHAUS TOOL DIVISION OFFERS METAL CUTTING BAND SAWS FOR ALL OPERATIONS

Peddinghaus Corporation, an industry leader providing innovative machine tool technology for structural steel and plate fabrication, offers a wide range of Eco-Line band saws for cutting of steel.

Peddinghaus specifically developed the Eco-Line steel band sawing machines to meet the needs of daily production requirements. As with all Peddinghaus products, the Eco-Line band saws were developed with the user's needs in mind. These saws can cut at a 30°, 45°, 90°, and 135° angle. Offering a full range of capabilities, the Eco-Line band saws facilitate the integration of straight and mitre cuts into the section size.

This line is best suited for cutting material with different cross-sections and frequent change of straight mitre cuts. The swivel of the saw head remains the same for each mitre cut above the intersection of the saw blade, and fixed vice so that there is a datum measuring point that does not change, resulting in no material loss.

The cutting systems of Bach can be equipped with several cutting torches for optimal batch production.

The 320G-HSS model delivers fast and efficient mitre sawing economically. The 320G-HSS saws up to 305mm high, and 495mm wide at 90°, with a 178mm high, and 178mm wide capacity up to 60°.

The 320 Series band saws are designed and manufactured for lighter duty operations. However, like its counterparts, the 320 models are built with the same rugged performance components. This saw is capable and ready for cutting tasks associated with beams, columns, tubing, pipe, angle, channel, round and square stock.

The production minded 410 DGA 2300 is ideally suited for streamlined orientated manufacturing, steel stocking centres and fabrication shop production. This automated saw delivers CNC accuracy and repeatability up to 410mm high and 698.5mm wide at 90° as well as 400mm high and 317.5mm wide up to 60°.

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## INDUSTRY NEWS

# JOB CREATION:
## POWER PYLONS DESIGNATED

By Kobus de Beer,
Industry Development Executive, SAISC

*The effect on the local power pylon producers as well as producers of all the equipment needed to build these lines is encouraging. The past few years saw producers scaling down, retrenching and closing down operations in spite of the growing demand for new transmission lines from ESKOM, mainly as a result of imported products of acceptable quality from the Far East being offered at subsidised prices.*

During the tribulations of the COP 2011 Conference in Durban in December 2011 a major job creation initiative went almost unnoticed: Minister Rob Davies declared a few products including power pylons used for the transmission of high voltage electricity throughout South Africa as 'designated products'. Other designated products include locomotives and railway rolling stock, buses, canned vegetables, clothing, textiles, etc.

Designation essentially means that 'organs of state', including state-owned enterprises (SoE's) such as ESKOM and Transnet, as well as provincial and municipal entities and others have to buy South African produced goods. Designated products will require a certain minimum level of local content in terms of the Preferential Procurement Policy Framework Act (PPPFA), which came into effect at the beginning of December 2011. This is not intended to take the place of the various other government efforts to encourage local procurement and supplier development strategies, but rather to support these.

The effect on the local power pylon producers as well as producers of all the equipment needed to build these lines is encouraging. The past few years saw producers scaling down, retrenching and closing down operations in spite of the growing demand for new transmission lines from ESKOM, mainly as a result of imported products of acceptable quality from the Far East being offered at subsidised prices.

The SAISC monitored these imports and tried to mitigate this situation. The Institute analysed the industry, made contact with ESKOM and all industry participants, and explored various avenues, including possible participation in the CSDP (Competitive Supplier Development Program). Eventually the comprehensive submission required by ITAC (International Trade Agreement Committee) was compiled and submitted on behalf of the industry with an application for 15% import protection. This was granted by the DTI after due process and gazetted during March 2011. Unfortunately it came too late to prevent tens of thousands of tons of ready-made power pylons to be imported. When the SAISC became aware of the investigations into appropriate designated products, we submitted an application and motivation for power pylons to the DTI.

ESKOM's Transmission Ten Year Development Plan for the period 2012 to 2021 provides details of their annual requirements for various new extensions of the 400kV and 765kV transmission network as well as for the new transmission lines needed to transmit electricity from the two new coal fired power stations, Medupi, near Lephalale (Ellisras) and Kusile, near eMalahleni (Witbank). The total requirement for new power pylon steelwork for this period is in excess of 420 000 tons, averaging at some 42 000 tons per year. This requirement is of course not smoothed out and various peak load periods are foreseen.

In addition, the industry anticipates similar tonnages of power pylon steelwork that will be needed to repair, maintain and replace existing power lines. These requirements will also not be dispersed uniformly but will provide an opportunity of spreading the load over the period.

Developments in South Africa's neighbouring countries add a further demand for transmission lines and South Africa's proximity and good reputation gives us an advantage.

# INDUSTRY NEWS

It is calculated that this initiative will create between 1 200 and 1 500 full time 'decent' jobs just to provide the new requirements. These jobs represent a wide variety of skills and crafts including boilermakers and welders for production as well as electricians and millwrights to maintain and repair equipment. Other skills required are CNC and other machine operators, drilling operators, cropping machine operators, plasma cutter and cutting torch operators, slingers, forklift drivers, galvanizing plant operators, QC inspectors, crane drivers, handlers and bundlers, forklift and truck drivers, storemen as well as various services such as security, dispatch, cleaning, etc. Many further skills are required for the building of the power lines as well as fitting of ancillary equipment.

A powerful 'multiplier' applies in the industry where for every 1 000 direct jobs created a total of 2 600 full time decent jobs are achieved to supply materials, requirements, transportation, clothes, food and the many services in the South African economy. All these people contribute positively to the economy and carry a surprising number of dependents. Buying a R1m project locally results in R1.43m of economic activity, (including R0.35m in taxes!), helping us survive the hard times that are unavoidable in today's globalised world.

An opportunity exists to apply for more products to be declared 'designated'. The requirements are strict, and comprehensive information setting out the need and business case will have to be researched and then submitted. A further consideration is that only state-owned enterprises can be 'instructed' to buy

South African. It is important that producers continue to strive for competitiveness to encourage all clients investing in infrastructure to create decent local jobs through local procurement.

# STADIUMS: SYMBOLISM BEHIND THE STRUCTURE

By Leon F Krige,
Architectural Theory and Design



*In this discussion the underlying utopian fantasy of a 'once in a lifetime' mega-structure is investigated within the context of a Southern African reality versus global stadium typology.*

During and before the FIFA World Cup 2010 a number of conceptual designs were publicised for the two key stadiums - Soccer City and Cape Town Stadium. After selecting the 'winning' projects, the imagery represented at the time suited both local and international players, as clear and easily grasped 'African' icons with a global flavour. The underlying symbolism, which represents the extreme structural and management challenges of stadium typology, is explored in this article. In this discussion the underlying utopian fantasy of a 'once in a lifetime' mega-structure is investigated within the context of a Southern African reality versus global stadium typology.

During the period from 2007 till 2010, the South African construction industry was dominated by large and ambitious projects related to the FIFA World Cup 2010. Since the announcement was made that SA won the bid some eight years before, the research, financing and planning of such projects challenged and proved the ability of financiers, development agencies, structural designers and highly skilled professionals.

One of the key debates remains the polarity between functional global mega structures which fulfils extremely stringent requirements of a highly demanding projection of the sport industry versus regionally relevant design within a fragile cultural and economic infrastructure. This text raises the question of identity and form, comparing universally global morphology versus a local relevant signature in the critical sense. References to cinematic works are used to demonstrate the issues of symbolism as a link between past and present.

In the history of stadia, ancient precedent draws from Greek theatres built into natural amphitheatres, such as the theatres at Epidaurus and Delphi, both completed circa third century B.C. Although these stadia were aimed at intellectual discourse, there is a strong link between theatre as a pedagogic instrument relating tales of gods in a mythological context and the heroic feats of athletes. Much of this mythology is based on explaining relationships of power, hierarchy and the link between man and a higher deity.

The Roman amphitheatre witnessed the transformation of intellectual spaces where acts of violence were performed symbolically, into arenas of physical violence. The Roman forum is filled with tales of heroic chase, battle and slaughter from every outpost of the empire. The Colosseum in Rome however, became the theatre of the macabre, to entertain the masses with acts of violence which they were largely prohibited from performing within the rules of society.

The film *Gladiator* by Ridley Scott not only stages theatrical scenes, but repeatedly features an architectural model and reconstructions of the Colosseum and explores the power of violent sport as 'opiate of the masses'. The tale of displaced refugees who fight for their reputation to return as heroes is no different from the current transformation of local childhood prodigies into Peles, Ronaldinhos or Dr Khumalos.

In a contemporary genre, Swiss architects Herzog and De Meuron masterfully insinuate the violence of sport in the blood red cellular skin for their home city of Basel's stadium renovation. The Beijing Olympic stadium, dubbed the Bird's Nest, at first appears to be a random mesh of strands, but on closer inspection, each massive inclined steel tube links as a portal frame tangentially circumfering the central oculus. The connected web provides stability, especially during an earthquake. These global architects constantly engage in the conceptual essence of local socio-cultural context, most visibly expressed in the outer skin of projects scattered around the globe. There is a remarkable quality of critical regionalist expression present in their work driven by a deep theoretical understanding of contemporary culture and regional context.

In the case of Soccer City, renamed FNB Stadium, the surrounding (man-made) landscape creates the sense of an earth scraper, nestled between the mine dust, strategically placed between Johannesburg and Soweto. The sense of three dimensional mass buried into the earth is emphasised by the urban design of the metro rail station, pedestrian bridge and earthy colours blending into its context. Internally the helical concrete ramps and massive detail belie the elegance which holds the steel frame above the concrete datum. Beyond the 'clay pot' symbolism lies a weave of the most elegant, intricate steel trusses, angled and bowing to receive the network which holds up the roof above. Although the project was conceived and designed by local firm Boogertman and Partners, Italian steel specialists (with German engineering) added a sense of refined flair to the 'lightweight' roof, sadly only visible during construction.

This roof is held by a massive steel ring-beam which undulates with remarkable complexity. As

the final section of the roof truss was meant to slide in place, the tolerance seemed just too tight, a design error? A call to the Italian roof engineer answered the problem: "Did you read the manual? Wait for the temperature to drop to 23°C at dusk, then assemble..." It worked like a charm! Considering the enormous challenge of building an 86 000-seater stadium to FIFA specifications on an old, inaccurate stadium plinth for the first World Cup event in Africa, this is a miracle!

In David Lynch's *Dune*, the future scourge of limited resources, now becoming so relevant, is enacted on the planet Aracas, where a mysterious blue crystalline mineral is mined for its metabolic energy. A scientific detective, in his investigation of the planet, discovers not only the beauty of the desert, but the beast which rules it from below, and of course, produces and guards the mysterious blue substance. The fight between nature and man, 'good and evil' is represented by a simultaneous element of horror and intrigue with the sensual beauty and endless power of the enormous beast within. The analogy here, if you were wondering, is the remarkable mega-structure which holds the writhing form of each respective stadium in place, from the massive underground foundations to the soaring roof.

By comparison, the spider-web which ties the forces of the Cape Town Stadium is reminiscent of the eye of the Cyclops, an interconnected web which suspends an ethereal translucent membrane, so much like the layers of an eyelid, iris and pupil. Its oculus frames views of Table Mountain, the harbour, and the old military fort. In this case, the translucent skin reveals an ethereal hint of the layers within, the structure suspends a roof made of translucent, then transparent glass, allowing light to penetrate deep through the translucent ceiling, the most remarkable sequence, like the silken veils of Salome's dance. Walking on this ethereal landscape is the most surreal spatial experience imaginable, like an undulating dessert of translucent dunes, defiant of gravity and symmetry.

In this sense, each of these mega structures has found the essence of their own context. Soccer City is powerful in the man-made landscape of gold-dust, glowing with fire from within. Cape Town Stadium is ethereal, translucent, glowing like a deep sea creature from the Atlantic, eyeing the mountain. Many questions are asked about the viability for long-term use; with innovative strategies for both these structures they may live up to a nation's need for great moments, but only time will tell.

Every light on the field is positioned and aimed to provide optimum coverage, built to international standards of sightlines, safety and of course, FIFA's all 'seeing eye', the television camera. This is where symbolism returns to that ancient model of the Colosseum. As spectators around the world gather to watch an international game, the culture of sport recalls ancient, haunting sound of gladiators entering the arena...


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# SASFA: A BUILDING INDUSTRY PERSPECTIVE AND ACTION PLANS FOR 2012

By John Barnard, SASFA director

*The assessment of manufacturers of light steel framing for accreditation according to the SASFA Accreditation System will commence, while companies who have not yet applied will be encouraged to do so. This is to facilitate the implementation of quality management processes in line with ISO 9001 by all SASFA Manufacturing Members.*

Business conditions in the building industry remained under pressure during 2011, and a number of SASFA members expect that conditions will only improve towards the end of 2012. According to Stats SA, the floor area of new non-residential buildings completed during 2011 declined by 27% compared with 2010, whereas the area of residential buildings contracted by 'only' 6% - in total a decline of 13%. It is notable that the area of additions and alterations completed constituted 36% of the area of total buildings completed.

Trends derived from data of building plans that have been approved are indicative of building activity to be expected in the future, after a time lag of six to nine months. The floor area of plans passed during 2011 for non-residential building was 10% higher than during 2010, whereas the area of residential building plans passed increased by 2% - an indication that an upturn in building activity is expected.

## SASFA ACTION PLANS

During the SASFA AGM in November 2011, the SASFA Exco decided to maintain the focus on training and accreditation, and to increase marketing and promotional activities.

SASFA plans to again present its 6-day training course for building contractors in Gauteng (27 Feb to 3 March), Durban (end July) and Cape Town (end October). It covers the full spectrum of building activities, from foundations to the erection of light steel roof structures. The theoretical parts of the course is supplemented by practical work, as the course attendees erect a small steel structure, and partially clad it, to ensure understanding of the concepts. Candidates receive a certificate after successful completion of the course.

A course on the design of cold-formed steel structures to the newly published SANS 10162:2 is also in the pipeline. Details are currently being finalised. Lectures on LSFB to university students in building sciences and architecture will again be presented on request.

SASFA will continue with the assessment of manufacturers of light steel framing for accreditation according to the SASFA Accreditation System, while companies who have not yet applied will be encouraged to do so. This is to facilitate the implementation of quality management processes in line with ISO 9001 by all SASFA Manufacturing Members. With this stage completed, focus will turn to assessment of LSF builders.

As regards marketing and promotion of LSFB, SASFA plans to be represented at the major building exhibitions, with energy efficiency of light steel frame building as theme. Expansion of the South African market into the sub-Saharan region will be pursued. We plan to publish project articles to maintain regular media exposure, and a regular newsletter will be used to keep members informed of developments.

With the necessary support from its members, we are confident that most of these plans will be brought to fruition.

SOUTHERN AFRICAN LIGHT STEEL FRAME BUILDING ASSOCIATION

# CRYSTAL TOWERS BRIDGE

*All photographs courtesy of Vivid Architects*

*A most demanding and complex piece of design and implementation, this exciting and fresh new addition to the ever changing Century City skyline tested all involved, and the result is the simple, pleasurable experience of a leisurely stroll across the water.*

The classy Crystal Towers Bridge is the fifth bridge spanning the Grand Canal to be built at Century City providing pedestrian links between the north and south banks. The bridge was part of the client's future vision for the central 'main street' spine, currently serving as access to the hotel and residential apartments, to link pedestrians through to the Canal Walk shopping centre situated across the canal.

## FROM THE ARCHITECT'S DESIGN PHILOSOPHY

The site spans 80m diagonally across the canal, encompassing three sites – Crystal Towers, Canal Walk, and the CCPOA owned canal. The bridge springs lightly from the Crystal Towers East Terrace, and through agreement lands within the landscaped canal-side ground of Canal Walk, boosting pedestrian traffic through the under utilised green spaces on the canal's edge. The agreed intention was to link the bridge at a high level with a direct connection into the heart of the shopping precinct. This link was created using a beautiful tied arch suspension bridge.

The design philosophy is simple and has three main aims.

Firstly, to create a directional form that respects the organic flow of movement as it turns through the diagonal. This is seen as vital to ensure the design fits as close to a desired path as is feasible within the site constraints.

Secondly, to enhance this fluidity with the three dimensional form – the two main curves of walkway and arch oppose each other creating intentional tension with their connection with the filigree web of support cables.

Lastly, to create an independent, distinct, and memorable gateway form within an existing urban waterfront experience. The scale and form of which should hold its own in both the long vista down the length of the canal and also when viewed against the large scale back drop of the Crystal Towers development. This is strengthened through the lighting design of colour changing LED's which add a gateway of light to the canal vista every evening.

The architect's precedent research comprised of looking closely at European foot bridges, in particular the Gateshead Millenium Bridge and the Merchants Bridge, Manchester. In addition the engineer progressed in depth design studies with important guidance from UCT and Stellenbosch Universities.

## TO A WORKABLE ENGINEERING DESIGN

The engineer's most important design challenge was that the bridge had to conform to the recommended vibration limits in the relevant British Standards. They found this to be very sensitive to different modelling criteria. Fortunately with the aid of software they were able to play with the shape and alignment of the bridge, element stiffness, massing of elements, various angle configurations of the hanger cables, splitting the supports and adjusting the span.

For the serviceability requirements Professor Moyo at the University of Cape Town carried out the necessary design review. This included performing a finite element analysis on the bridge to check that it conformed to relevant codes of practice, and also compared the results to Setra Guidelines and Concrete Centre Guideline. The bridge met all the lateral and vertical natural frequency requirements for the given design loads e.g. pedestrians.

The engineer approached Dr J Strasheim of the Stellenbosch University for the structural strength and stability review. Dr Strasheim did a full buckling analysis of the steel arch and plates as well as a design check on the cables themselves.

## TO THE CONSTRUCTION AND ERECTION OF THE BRIDGE

The construction programme had to fit in along with the festive season and the substantial bridge foundation on the shopping centre side of the canal could not be cast until after the December holidays so as not to disrupt access for shoppers.

The various elements of the bridge were constructed off site in roughly 6m lengths and brought to site already primed and painted. The segments were then placed on the temporary supports and welded together in position. At certain strategic points the main arch tube was filled with concrete to achieve the necessary serviceability and strength requirements.

Given the very limited access on site, the lay-down areas as well as the erection procedure was extremely challenging. With Canal Walk Shopping Centre's permission the contractors were able to close part of the delivery road servicing the main receiving areas and this allowed them space for a lay-down area as well as a mobile crane. A series of jetties and walkways in and around the muddy canal were installed in strategic positions in order to support the temporary support work. These jetties were founded using driven timber piles.

At the same time as the arch was being erected the suspended walkway structure was being installed in segments below. The walkway was pre-cambered to allow for any deflections. Lastly the hangers were attached and loosely tightened.

The deck was then de-propped simultaneously allowing the cables to be loaded gradually and evenly to reduce the possibility of deformation. Upon releasing the props the deflection under dead loads was negligible.

A most demanding and complex piece of design and implementation, this exciting and fresh new addition to the ever changing Century City skyline tested all involved, and the result is the simple, pleasurable experience of a leisurely stroll across the water.

## project team

**Developer/ Owner:**
Rabie Property Group

**Architect:**
Vivid Architects

**Structural Engineer:**
Sutherland

**Quantity Surveyor:**
B&L Quantity Surveyor

**Main Contractor:**
Konti Steel

**Steelwork Contractor/s:**
Konti Steel

# LAERSKOOL PRETORIA-OOS TENNIS CLUBHOUSE

*This project had a major impact on the community and has become a precedent for what can be done at a government school, breaking away from the 'stuck forever typology'. The school board's progressive approach has paved the way for a new attitude which recognises the value that fine architecture brings to our built environment.*

Photo: Pieter Mathews

This tennis clubhouse forms part of a series of small interventions at a public school. The high visibility of the site influenced the school board to invest in good design to generate additional income from venue hire. This project had a major impact on the community and has become a precedent for what can be done at a government school, breaking away from the 'stuck forever typology'. The school board's progressive approach has paved the way for a new attitude which recognises the value that fine architecture brings to our built environment. In the process the pupils have also been exposed to the architecture discipline. Any criticism against their initiative petered out as the buildings started to generate income and create a positive image for the school.

The need for this new tennis clubhouse arose after a strong wind destroyed the existing building. After the success of the previous phase, the school board decided unanimously to build another architecturally designed structure to compliment and enter into architectural dialogue with the latest building. Soft curves define the office/storage space while delivering optimum view lines to the tennis courts, and a raised plinth provides natural continuous seating from

Photo: Sven Nurnberger

The mono-pitch roof tilts up towards the east, screening off the western sun.

where sporting activities can be viewed without the need for additional loose seating. To accommodate guests and learners doing their homework there is a covered open space which leads into the enclosed glazed area. The mono-pitch roof tilts up towards the east, screening off the western sun while picking up on the scale of the existing athletics grandstand to the north.

Steel was chosen as the primary structural material so that the entire building could be manufactured offsite and then simply be assembled on-site, thereby minimising construction time and disruption to the school. The design used the steel elements in the 'honest' way a jeweller would design a piece of jewellery, accentuating its authentic qualities. The structure appears light, with the roof floating and creates an open, free space. Louvers, also from steel, were added to screen off the harsh western sun and act as a feathering device, softening the roof silhouette. The bottom of each steel screen bracket houses a LED light which glows blue at night and creates a striking effect at a minimum cost – the steel structure thereby also becomes part of the lighting fixtures. This use of steel seems unusual at a public school, yet this is part of 'breaking out of the box' – changing the perception of what a school building should typically be.

All the new buildings of the precinct have already had a positive return on investment for the school, with a number of successful profitable functions hosted at the facilities as well as creating a modern progressive image – demonstrating how architecture can impact positively on a community.

## project team

**Developer/Owner:**

School Board of the Laerskool Pretoria-Oos

**Architect:**

Mathews & Associates Architects cc

**Structural Engineer:**

P-Design cc

**Main Contractor:**

One Peter 2 Construction cc

**Steelwork Contractor/s:**

Secure-o-line

**Detailers/Detailing Company:**

Danru Plant and Construction

# MOYO ON THE PIER

*The design solution: All the service elements at ground floor are removable in the likelihood of high seas. In addition, in the unlikely event that these elements are not removed, they are designed to fail and break up so as not to transfer horizontal loads to the existing pier structure.*

Jason Lurie of Moyo's vision for Moyo at uShaka Marine World was to expand the restaurant space, above the beachfront promenade, to the end of the pier. The City of Durban supported this vision that would breathe life into the uShaka Marine World precinct. The structure however posed some unique challenges and made for an interesting steel project for the whole professional team. The building was designed to suit the needs of Moyo as the tenant but is owned by uShaka Marine World, therefore the professional team took the view that the building should offer a flexibility that could respond to almost any commercial need.

When standing at the very end of a pier one usually experience a feeling of being separated from the land and 'floating' above the sea. So the designers decided that the entrance of the building should be from the see-end of the pier, so that visitors can still experience that. The area around the building is serviced by the tenant but is still open to the general public to have access to the pier end that offers a clear view over the sea, north and south.

The structure has two levels. The entrance is set at the pier-level bar area and the primary event space is up-stairs. The character of the restaurant is airy and open with the elevated platform allowing a 360-degree view of the city, harbour, sea and sky. Simple opening aluminium sliding door sections provide environmental control and access to balconies on the north-west and south-east of the building.

The design provides solutions for the safe removal of waste, simple removal of ground floor service modules for the maintenance of aquarium pumps, and an internal environment that responds to prevailing weather. Service modules, providing limited kitchen and toilets facilities, are mobile units and separate from the structure and can be removed from the pier if necessary.

The roof is resolved as a bent plane; it is level on three sides and radiuses on the fourth (land facing). Although the roof form is simple the construction is complex. The structure of the building relies on five steel portals, each with a top rafter that is curved to a specific radius. The easternmost portal has a straight rafter. The next one in is slightly curved, with the next more curved. Thus the shape of the building is square on three sides with a curve on the eastern roof. Evenly spaced timber joists

The pier is still a structure to service the well-points located below the end platform of the pier and great care was taken to prevent any environmental contamination.


A night view of the restaurant at the end of the pier (with apologies to Douglas Adams, Ed).

set between the curved rafters are the ribs of the structure, clad top and bottom with plywood. The roof was constructed based on the method used to manufacture wooden ship hulls, using the strength of steel as the primary ribs.

The loading requirement, in particular the wave action, was a major consideration for the design of the restaurant. The existing pier was constructed as the support structure for the sea water extraction system, which is located beneath the 'bulb-shaped' platform at the seaward end of the pier.

The wave loading (magnitude and direction) used in the original design of the pier was provided by the CSIR, and did not take into account the possibility of additional structures being built on the deck. Although the existing pier structure is capable of accommodating the vertical loads of the proposed pavilion structure, it was not designed to resist horizontal loads transferred from the new restaurant.

Due to the tough environmental regulations on the site, no wet work, painting or 'dirty' construction methods were permitted on the pier so steel was the obvious answer.

Therefore, in the event of waves overtopping the existing pier deck, the proposed structure has been designed so that no building elements other than the primary structure elements (i.e. the structural steel portal frame) are able to transfer horizontal loads to the existing pier structure.

The design solution was: All the service elements at ground floor are removable in the likelihood of high seas. In addition, in the unlikely event that these elements are not removed, they are designed to fail and break up so as not to transfer horizontal loads to the existing pier structure. The ground floor internal walling is designed as demountable and will fail under pressure from overtopping waves.

The structure and building components needed to be light-weight and prefabricated. The only access to the site is the three metre-wide pier, which meant all components were designed and prefabricated to fit and be transported by light vehicles. Due to the tough environmental regulations on the site, no wet work, painting or 'dirty' construction methods were permitted on the pier so steel was the obvious answer.

The structure is deemed to be movable, to suit both the incidents of storm waves engulfing the pier, and accessibility to the well points below. Furthermore to maintain the overall flexibility of the site, both in terms of the pier usage, and Moyo's ability to relocate the restaurant, a sustainable solution to the structure had to be provided. As such, the re-use of the structure was

achieved by adopting reversible connections, and a construction sequence that was easily demountable, so that deconstruction could take place with no damage to the steelwork. And again steel perfectly addressed this type of sustainable functionality.

Using steel construction in a marine environment such as this required a great deal of care to ensure longevity of the steel components. The corrosion protection specification was therefore thoroughly researched, and meticulously tested on site.

There are two different applications of steel work used on the pier, namely the intake platform located at -0.2MSL, and the primary structure of the Moyo restaurant located on top of the pier. Although both are located in an extremely aggressive environment, there is a difference in exposure conditions, and therefore a different approach to each corrosion protection system.

The steel platform is obviously situated within the more aggressive environment, and as such a variety of high tech systems were put in place.

The final specification was:

- 2mm sacrificial allowance in the structural design of the steel members resulting in a possible 20 years safe life of the structure after unforeseen failure of the primary protection systems.

## project team

**Architect:**
Koop (in association with ZAI)

**Structural Engineer:**
Arup Pty Ltd

**Quantity Surveyor:**
MRQS

**Project Manager:**
Profica

**Main Contractor:**
Reed Simpson Construction

**Steelwork Contractor/s:**
Ramwal Engineering

The character of the restaurant is airy and open with the elevated platform allowing a 360-degree view of the city, harbour, sea and sky.

- 1 000 micron reinforced polyester glass flake coating (Archco-Rigidon Rigspray Micro – system 457) as the primary corrosion protection system with a 20-year guaranteed maintenance free service.
- A 'sacrificial anode type' cathodic protection system, in addition to the glass flake barrier coat, providing cover resulting from unforeseen failure of the barrier coat, and offering a 25 year life to the first maintenance of the steelwork/cathodic protection system.

The primary structural steelwork of the restaurant was protected using a duplex system.

The final specification was as follows:

- Galvanize to SANS 121 (ISO 1461). Dry abrasive blast in accordance with the International Standard ISO 8501-1:1988 to obtain a surface profile of 25-75 microns.
- One coat Carboline 658 Twin Pack epoxy zinc rich primer of thickness 75 microns; one coat Carboline 893 Epoxy polyamide of thickness 75 microns; one coat Carboline 134 Aliphatic Acrylic Polyurethane of thickness 40 microns

Stating that the site is environmentally sensitive is almost stating the obvious. The pier is a structure to service the well-points located below the end platform of the pier. Any contamination of the sea here would pass directly into the aquarium at uShaka and endanger aquarium and marine life. Strict environmental controls were enforced.

The professional team feared that Moyo on the Pier would never be built. Even from the start it was always going to be a long shot getting environmental, municipal, coastal, heritage and local town planning approval. When the project finally got the green light there were five months for design development, documentation, tendering and delivery of the building. The fact that it got delivered in time is a tribute to the client, professional and contracting team.

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*There is no doubt that the role of the detailer in the structural steel food chain is a critical one. He not only interprets the engineer's design requirements and converts them into work shop instructions but quite often is a major contributor to the 'buildability' of an engineer's design.*

*He certainly plays that most important communication link between the design engineer and the workshop that actually makes the structure and erector team that puts it up.*

*And even though the SAISC is so aware of the important role they play, due to one of those 'Murphy' moments the Steel Awards 2011 Issue of Steel Construction omitted to list the detailing companies in the project teams of the winners and entries of Steel Awards 2011. Steel Construction sincerely apologises for this omission and hope that this special mention gives them the recognition they deserve.*

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*Telephone:* +27 11 486 3002

**Tree-column structures:**
**KRU**
*Contact person:* Mitch Niemandt
*E-mail:* mitch@kru.co.za
*Telephone:* +27 11 788 1144

## ENTRIES: Bridge category

**Mangaung Bridge, Hangar Street**

**Draughtline**
*Contact person:* Herman Bester
*E-mail:* herman@compuking.co.za
*Telephone:* +27 82 057 3236

**Markgraaff Pedestrian Bridge**

**Draughtline**
*Contact person:* Herman Bester
*E-mail:* herman@compuking.co.za
*Telephone:* +27 82 057 3236

**Lynwood Glen Pedestrian and Pipe Bridge**

**Mondo Cane (Pty) Ltd**
*Contact person:* Rob Chalmers
*E-mail:* rob@mondocane.co.za
*Telephone:* +27 21 852 2447

## ENTRIES: Architectural category

**Laerskool Pretoria-Oos Tennis Clubhouse**

**Danru Plant and Construction (Secur-o-line)**
*Contact person:* Claudine Nagel
*Telephone:* +27 12 808 2679

**Levy Business Park, Lusaka, Zambia**

**Precise Structural Modelling (Pty) Ltd**
*Contact person:* Rowan Chislett
*E-mail:* rowan@psmod.co.za
*Telelephone:* +27 31 205 6906

**Pick n' Pay Retail Centre**

**Bendraft Engineering Services cc**
*Contact person:* Riaan Grobler
*E-mail:* bendraft@bendraft.co.za
*Telephone:* +27 11 849 7731/9184

**Waterkloof Corner**

**KRU Detailing cc**
*Contact person:* Mitch Niemandt
*E-mail:* mitch@kru.co.za
*Telephone:* +27 11 788 1144

**Alzu Petroport**


**Vision Draughting**
*Contact person:* Andries Visagie
*E-mail:* visiondraughting@vodamail.co.za
*Telephone:* +27 11 768 7508

**MCB Ebene for Mauritius Commercial Bank**

**Mondo Cane (Pty) Ltd**
*Contact person:* Rob Chalmers
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*Telephone:* +27 21 852 2447

**Alice Lane**

**Ferro Draughting (Pty) Ltd**
*Contact person:* Chris Narbonese
*E-mail:* chris@ferroe.co.za
*Telephone:* +27 12 803 8035

**Walker Creek entrance canopies**

**Ferro Draughting (Pty) Ltd**
*Contact person:* Chris Narbonese
*E-mail:* chris@ferroe.co.za
*Telephone:* +27 12 803 8035

**Brits Mall**

**Ferro Draughting (Pty) Ltd**
*Contact person:* Chris Narbonese
*E-mail:* chris@ferroe.co.za
*Telephone:* +27 12 803 8035

## ENTRIES: Tubular category

### Comair Simulator Building

**Ferro Draughting (Pty) Ltd**
*Contact person:* Chris Narbonese
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*Telephone:* +27 12 803 8035

### Fountains Circle

**Mondo Cane (Pty) Ltd**
*Contact person:* Rob Chalmers
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*Telephone:* +27 21 852 2447

### Mall of the North


**OmniStruct Nkosi (Pty) Ltd**
*Contact person:* Glen Banks
*E-mail:* glen@osn.co.za
*Telephone:* +27 11 474 9140

### Riverside Mall New Entrance

**Vision Draughting**
*Contact person:* Andries Visagie
*E-mail:* visiondraughting@vodamail.co.za
*Telephone:* +27 11 768 7508

### Facilities at Kisumu Airport

**Mondo Cane (Pty) Ltd**
*Contact person:* Rob Chalmers
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*Telephone:* +27 21 852 2447

### Offices for the Gauteng Provincial Government

**Trowbridge, Higson-Smith & Associates**
*Contact person:* Keith Trowbridge
*E-mail:* admin@trowbridge.co.za
*Telephone:* +27 11 447 9786

### Gautrain - Pretoria Station


**OmniStruct Nkosi (Pty) Ltd**
*Contact person:* Glen Banks
*E-mail:* glen@osn.co.za
*Telephone:* +27 11 474 9140

## ENTRIES: Mining and industrial category

### Tower for Mascom Wireless Botswana Innovation Centre

**Sectional Poles A Division of Harrison and White Investments (Pty) Ltd**
*Contact person:* Daan van der Sijde
*E-mail:* dvandersijde@sectionalpoles.co.za
*Telephone:* +27 12 348 8660

### Eureka DIY Solutions

**Robor (Pty) Ltd**
*Contact person:* Hendrik Beyleveld
*E-mail:* hendrikb@robor.co.za
*Telephone:* +27 11 971 1600

### Monsanto

**B & T Steel**
*Contact person:* Bryan Wilken
*E-mail:* marketing@btsteel.co.za
*Telephone:* +27 13 665 1914

### Renexcon

**B & T Steel**
*Contact person:* Bryan Wilken
*E-mail:* marketing@btsteel.co.za
*Telephone:* +27 13 665 1914

### Unilever Dry Food Distribution Facility

**Impact Engineering cc**
*Contact person:* Desmond Reddy
*E-mail:* desmond@impacteng.co.za
*Telephone:* +27 32 947 1054

### Strandfoam Kosmosdal

**Bendraft Engineering Services cc**
*Contact person:* Riaan Grobler
*E-mail:* bendraft@bendraft.co.za
*Telephone:* +27 11 849 7731/9184

### Impilo Entsha: New Building Project Kellogg's, Springs

**A. Leita Steel Construction**
*Contact person:* Gerhard Herselman
*E-mail:* gerhard@aleita.co.za
*Telephone:* +27 12 803 4360

### South Deep Mine New Rock Winder House

**3D Struct**
*Contact person:* Werner Herholdt
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*Telephone:* + 27 11 975 0647

# AN UPDATE ON LAMINATIONS/ LAMELLAR TEARING IN PLATE

By Spencer Erling,
Education Director, SAISC

*The suggested good practice proposal for flanges thicker than 20mm is that a safety check using ultrasonic methods should be done to ensure that there are no laminations (or if there are laminations they of an acceptable amount) in the steel before welding webs to the flange.*

It is common knowledge that from time to time (in fact quite rarely) steel plates thicker than 20mm suffer from a problem called laminations.

**What is a lamination and/or lamellar tear?**

Laminations (strictly speaking they should be called centre line laminations) constitute a phenomenon that occurs in the continuous casting process and subsequent rolling process of plates where, if there is a reasonable concentration of sulphide and oxide inclusions/crystals in the steel, they migrate to the centre of the casting as cooling occurs from outside to inside. They remain near the centre in the subsequent rolling process and if there are sufficient inclusions/crystals present then separation can occur, called a lamination.

Lamellar tearing is a phenomenon that occurs during or after welding, also as a result of the inclusions/crystals mentioned above in certain weld situations. This can occur where complete joint penetration welds (CJP also commonly called full strength butt welds) are required in 'Tee', cruciform and box side to top connections, resulting in through thickness stresses as depicted in Figure 1.

**In what circumstances are laminations or lamellar tears not desirable?**

In dynamically loaded elements of a steel structure, careful consideration should be given to not having laminations or lamellar tears, or when they do occur, keeping the occurrences down to an acceptable level. The risk relates to welded plate girder, box or 'Tee' construction for bridges, crane girders, supports for vibrating equipment and the like.

**What are the methods available to the engineer or contractor to ensure he has lamination acceptable steel?**

Both ArcelorMittal and Evraz Highveld Steel will supply plates that have been ultrasonically tested to determine the level of laminations found in the steel after rolling. This is subject to an extra charge.

Please be advised that even if steel to SANS50025 S355JR is called up in an order, there is no requirement for the steel mill to do Charpy notch tests for ductility (as inferred in the name of the steel) unless specifically called up in the order for the steel. Neither is any ultrasonic testing required unless called up in the order for the plate.

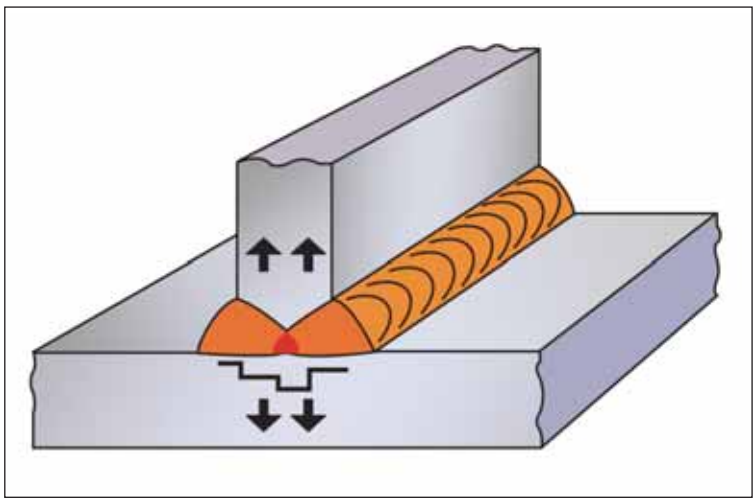


Figure 1: Formation of lamellar tears.

Evraz Highveld has a clause (see below) on the subject relating to laminations in their conditions of sale document which highlights the commercial risk to the purchaser of not calling up this requirement with their order on the mill.

***Conditions of Sale – Domestic Steel***

*"5.2.3. Unless specified by the purchaser at the time of ordering, there is no obligation on the supplier to carry out ultrasonic testing. Where design considerations require plates to comply with a minimum ultrasonic acceptance level, verification by ultrasonic testing should be carried out.*

*The requirements should be indicated at the time of ordering and will be subject to a price extra. No claims for ultrasonic failure will be considered unless this requirement has been met."*

**What acceptance criteria should be called up when requiring ultrasonic testing of plates?**

The acceptance criteria are defined in ISO10160 for laminations (and/or lamellar tears as described below) and should be limited to those described in ISO 10160 for category S1. This document gives details of the probe type and sensitivity settings required for UT machines or testing of CJP welds and for detection of laminations and lamellar tearing to ensure standardisation and that only correct readings are assessed to conform to S1 acceptance criteria.

This is a difficult standard to achieve unless properly trained persons using the correct equipment carry out and interpret the NDT.

In summarised format, S1 permits individual defects up to 1 000mm$^2$ each (which equates to a 35mm diameter if circular, or 31mm square). 15 such defects are allowed in the most populated 1m x 1m square.

**How can you reduce the risk of lamellar tearing during welding?**

There are several well known factors that can affect lamellar tearing:

- How thick is the steel?
- What is the weld size and detail?
- Does the weld procedure specification call for pre-heating to the weld? (A weld procedure specification (WPS) is a document usually prepared by a welding engineer or similar qualified person to cover each type of

weld, by size, by process, by position and covers every variable aspect of the weld. By adhering to the recommendations of the procedure, which is subject to testing to prove the procedure does in fact work, before putting into a production environment, and by using a welder who is trained and qualified to perform the weld to the procedure there is a very good chance of getting a good weld to specification.)

- How restrained is the steel i.e. can it shrink and change shape freely?
- The detail of the weldment.

Euronorms (EN1993-1-10:2005/AC Eurocode 3: Design of steel structures-Part 1-10: Material toughness and through-thickness properties) have evolved a method of reviewing various connection details to determine the 'risk' of lamellar tears occurring.

Table1 defines the method for engineers to determine the risk of lamellar tearing in fabrications and connections. ΣZ is calculated and if less than 25 for example Z25 plate would be specified.

The engineer determines the risk. He can then call up special grades of plate to be used i.e. Z15, Z25 or Z35.

These plates are enormously expensive and should really only be used in very high risk connections. Specific care must be taken to ensure the correct grade of plate is called up and used in the right place by the workshops.

In the UK, because the additional cost of this quality of plate is directly associated with the test method, they have opted to only work with Z35 quality plate where required.

**What are the risks associated with welded plate or box girders in a static application?**

With reference to Table 1 the following parameters are usually associated with statically loaded girders:

1. Flange to web welds, continuous fillet welds (Zb)
2. Typical flange thickness up to 40mm thick usually requiring only an 8mm fillet weld (leg length size per AWS) (Za and Zc)
3. Webs are usually without web stiffeners so have the possibility of free shrinkage (Zd)
4. No preheating of welds (Ze= 0)

If one now determines the Z risk factor you find
Za + Zb + Zc + Zd + Ze= 12 +0 +8/2 +0 + 0=16

Most modern steel mills produce steel that will normally fall into the range of Z15-Z25 and in addition if there is any doubt if preheating to over 100°C is applied Ze now becomes -8 reducing the Z risk to 8.

This highlights how unlikely it is that for a run-of-the-mill static girder lamellar tearing will be a risk.

So the suggested good practice proposal for flanges thicker than 20mm is that a safety check using ultrasonic methods should be done to ensure that there are no laminations (or if there are laminations they should be of an acceptable amount) in the steel before welding webs to the flange. If the girder is a relatively big girder with large loads some random testing for lamellar tearing would be in order.

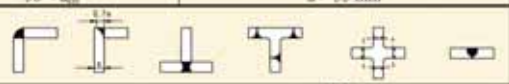
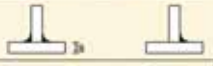
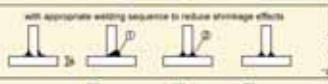
| | | | | |
|---|---|---|---|---|
| a) | Weld depth relevant for straining from metal shrinkage | Effective weld depth $a_{eff}$ (see Figure 3.2) = throat thickn. a of fillet welds | | $Z_a$ |
| | | $a_{eff} \leq$ 7mm | a = 5 mm | $Z_a$ = 0 |
| | | 7 < $a_{eff} \leq$ 10mm | a = 7 mm | $Z_a$ = 3 |
| | | 10 < $a_{eff} \leq$ 20mm | a = 14 mm | $Z_a$ = 6 |
| | | 20 < $a_{eff} \leq$ 30mm | a = 21 mm | $Z_a$ = 9 |
| | | 30 < $a_{eff} \leq$ 40mm | a = 28 mm | $Z_a$ = 12 |
| | | 40 < $a_{eff} \leq$ 50mm | a = 35 mm | $Z_a$ = 15 |
| | | 50 < $a_{eff}$ | a > 35 mm | $Z_a$ = 15 |
| b) | Shape and position of welds in T- and cruciform- and corner-connections |  | | $Z_b$ = -25 |
| | | corner joints  | | $Z_b$ = -10 |
| | | single run fillet welds $Z_b$ = 0 or fillet welds with $Z_b$ > 1 with buttering with low strength weld material  | | $Z_b$ = -5 |
| | | multi run fillet welds  | | $Z_b$ = 0 |
| | | partial and full penetration welds  | | $Z_b$ = 3 |
| | | partial and full penetration welds  | | $Z_b$ = 5 |
| | | corner joints  | | $Z_b$ = 8 |
| c) | Effect of material thickness $s$ on restraint to shrinkage | $s \leq$ 10mm | | $Z_c$ = 2 |
| | | 10 < $s \leq$ 20mm | | $Z_c$ = 4 |
| | | 20 < $s \leq$ 30mm | | $Z_c$ = 6 |
| | | 30 < $s \leq$ 40mm | | $Z_c$ = 8 |
| | | 40 < $s \leq$ 50mm | | $Z_c$ = 10 |
| | | 50 < $s \leq$ 60mm | | $Z_c$ = 12 |
| | | 60 < $s \leq$ 70mm | | $Z_c$ = 15 |
| | | 70 < $s$ | | $Z_c$ = 15 |
| d) | Remote restraint of shrinkage after welding by other portions of the structure | Low restraint: | Free shrinkage possible (e.g. T-joints) | $Z_d$ = 0 |
| | | Medium restraint: | Free shrinkage restricted (e.g. diaphragms in box girders) | $Z_d$ = 3 |
| | | High restraint: | Free shrinkage not possible (e.g. stringers in orthotropic deck plates) | $Z_d$ = 5 |
| e) | Influence of preheating | Without preheating | | $Z_e$ = 0 |
| | | Preheating ≥ 100°C | | $Z_e$ = -8 |
| * May be reduced by 50% for material stressed, in the through-thickness direction, by compression due to predominantly static loads. | | | | |

Table 1: Determining the risk of lamellar tearing in a connection.

# Machinery and systems for the high quality processing of metal profiles

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# COMMENT ON THE QUALITY OF HOT DIP GALVANIZING WHEN DIPPING IMPORTED STRUCTURAL STEEL SECTIONS

By Terry Smith, Technical Marketing Director, Hot Dip Galvanizers Association Southern Africa

*A substantial quantity of steel has been imported into South Africa. We are aware that sometimes the material certificates are not supplied with foreign steel and if they are supplied they are not necessarily accurate.*

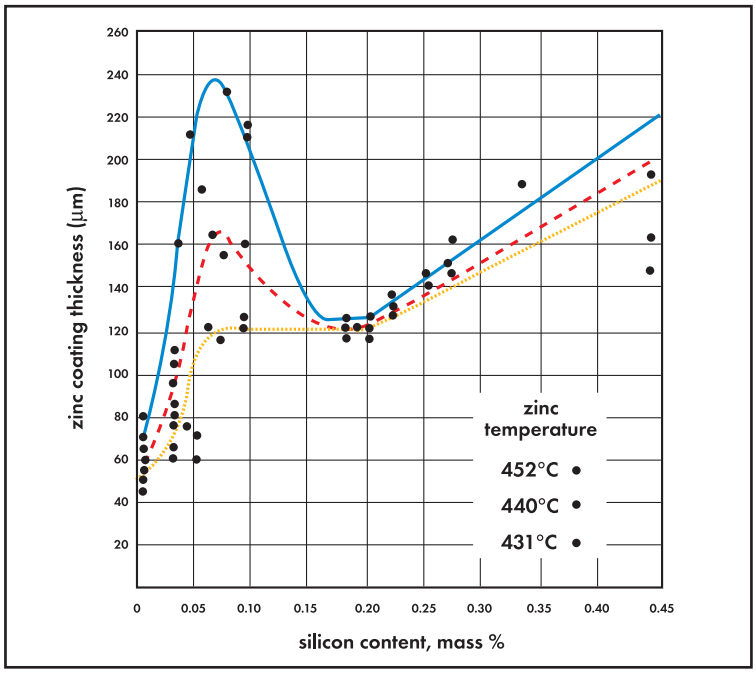


Figure 1: Bath temperature effect on the Traditional Sandelin Curve.

It should be reasonably common knowledge that to achieve a good quality hot dip galvanized coating thickness in terms of SANS121of a minimum mean of about 85 microns on structural steel, the silicon content of the steel should be limited to the ideal requirements of the well known Sandelin curve *(see figure 1)* which basically tells us:

The two chemical constituents in steel that affect coating thickness and aesthetic appearance are silicon and phosphorous. When the silicon falls out of the two desirable ranges on the Sandelin Curve, an extremely thick and easily damaged unsightly coat of zinc is the result. However, when the phosphorous content falls into the out-of-specification range, it affects the successful metallurgical bonding of the coating (i.e. the galvanizing will delaminate in large localised areas).

Ideal steels require a silicon content to fall between 0.02 to 0.04% (the so-called 'aluminium killed steel') and 0.15 to 0.25% ('silicon killed steel').

Cracking of the coating caused by high levels of phosphorous can cause follow on coating delamination.

Out of spec. high levels of phosphorous can cause severe cracking of the coating.

The maximum phosphorous content should be less than 0.02%. Steel that falls out of these ranges are called 'reactive' steel when it comes to galvanizing.

SANS 121 (ISO 1461) includes an Annex A, which addresses the essential information to be provided by the purchaser to the hot dip galvanizer. Even though the Annex is situated at the back of the Standard, it does not reduce its importance when specifying hot dip galvanizing to ensure the quality product we have come to expect from South African hot dip galvanizers. This includes information about the chemical composition of the steel.

Most general galvanizers will accept steel for hot dip galvanizing as long as the component has been reasonably designed and fabricated taking into account some simple design rules. However they cannot be aware of the potential reactivity of the steel in its black form with respect to molten zinc before hot dip galvanizing unless they have sight of material certificates which spell out the chemical composition of the steel.

For heavy duty coatings on heavy steel sections, usually required for underground mining conditions, a bit of reactivity is a good thing so that a hot dip galvanized coating thickness of in excess of 150 microns can be achieved.

The galvanizer takes responsibility for hot dip galvanizing the steel but the choice of steel grade and chemical composition of the steel is the responsibility of the specifier, his fabricator and the steel supplier, particularly when the latter has been informed that the steel is to be hot dip galvanized!

As a general rule, the fabricator should take responsibility for checking the chemical composition related to its suitability for hot dip galvanizing (as well as its conformance with design requirements) when purchasing the steel. The South African steel rolling mills will take care to supply, as long as it is ordered, steel that is suitable for hot dip galvanizing.

However, when it comes to the so-called commercial quality steels, no chemical composition certificates are available.

If the galvanizer is aware, that for a particular batch of steel, the chemical composition does fall into the 'problem steels' range he then can act accordingly. However, the methods he may use to limit coating build-up are generally insignificant in comparison to the coating buildup effect from extremely reactive steels. Should hot dip galvanizing of the steel be unsuccessful he may be able to offer his client a zinc thermal sprayed metal protective coating as an alternative.

It is also common knowledge that a substantial quantity of steel has been imported into South Africa. We are aware that sometimes the material certificates are not supplied with foreign steel and if they are supplied they are not necessarily accurate.

It has come to our notice of an incident where structural steel was hot dip galvanized where the silicon was in the ideal range but the phosphorous was as high as 0.042%! This resulted in coating cracking and significant subsequent delamination of the coating.

You have been warned to pay attention to the silicon and phosphorus content of steel you intend to galvanize.

# CALENDAR OF EVENTS

**SAISC BREAKFAST TALK – THE STATE OF THE SOUTH AFRICAN WELDING INDUSTRY**
**23 February 2012**
Country Club Johannesburg,
Auckland Park

**NORTH AMERICAN STEEL CONSTRUCTION CONFERENCE (NASCC)**
**18 – 20 April 2012**
Dallas
Visit www.aisc.org/nascc

**STEEL AWARDS 2012 – DEADLINE FOR ENTRIES**
**30 April 2012**

**SAISC GOLF DAY**
**9 May 2012**
Houghton Golf Club, Johannesburg

**STEEL AWARDS 2012**
**6 September 2012**
Gauteng – Emperors Palace
Cape & KZN (TBA)

**10TH INTERNATIONAL CONFERENCE ON ADVANCES IN STEEL CONCRETE COMPOSITE AND HYBRID STRUCTURES (ASCCS 2012)**
**2 to 4 July 2012**
Singapore

**14TH INTERNATIONAL SYMPOSIUM ON TUBULAR STRUCTURES**
**12 to 14 September 2012**
London, United Kingdom
www.imperial.ac.uk/ists14

**SMMH 2012 – STRUCTURES FOR MINING AND RELATED MATERIALS HANDLING INTERNATIONAL CONFERENCE**
**15–18 October 2012**
Vanderbijlpark

**SAISC AGM**
**15 November 2012**

**FOR MORE INFORMATION ON EVENTS VISIT OUR WEBSITE – www.saisc.co.za**

THE 31st EVENT

# saisc steel awards 2012

## AND THE 2ND STEEL AWARDS PHOTO COMPETITION

### THE STEEL CONSTRUCTION AWARD FOR EXCELLENCE IN THE USE OF STRUCTURAL STEEL

**CATEGORIES**

- No fixed categories – except the Tubular and Light Steel Frame Building Categories.
- Judges decide on the categories and winners based on the actual entries received.
- However, special attention will be given to sustainable development projects (green building, low environmental impact, community development etc.).

In 2011 the following categories were covered:

| Overall Winner | Tubular Structures | Light Steel Frame Building | Mining and Industrial | Architectural | Bridge

We do our best to give **ALL** projects entered some publicity – so please enter the projects you are most proud of.

**CRITERIA**

Does the project illustrate what can be achieved with steel?

Other factors to be considered:

| The importance of steel as a structural component of the project | Benefits achieved by using steel construction | Aesthetic appeal | Environmental/ sustainability consideration | Innovation in design, fabrication or construction | Technical prowess required for realising the project | Engineering expertise | Exceptional quality of workmanship | Tubular content | Export project | Satisfaction of client's brief, particularly cost and/or time efficiency | Special details: cladding, bolted or welded connections, or the like | Value to society/community development | Any other unique features |

**CONDITIONS OF ENTRY**

Go to www.saisc.co.za/steel_awards_2012 to see if your project qualifies

**ENTRY FEES**

A nominal entry fee will be charged this year for all nominations:

- Projects with a mass of less than 10 tons – Fixed rate of R500.00 (plus VAT)
- For larger projects a fee of R2 500 (plus VAT) will be charged which will entitle the nominator company to a discount of 50% on 2 seats at the Steel Awards dinner (your choice of venue – either Gauteng, Western Cape or KZN)

Once an entry is received, the person / company entering the project will be invoiced the relevant amount.

**MATERIAL TO BE SUBMITTED**

- The fully completed entry form
- Pictures of the project (one will be considered for the Photo Competition)
- A description of the project and a motivation for entering the project

**For the details and to submit your entry go to: www.saisc.co.za/steel_awards_2012**

Contact Reneé Pretorius | E-mail: renee@saisc.co.za | Cell: +27 (0)83 565 7173 | Tel: +27 (0)11 726 6111

# SOCIAL SNIPPETS

By Marlé Lötter,
Events Manager, SAISC

## SPREADING SOME CHEER!

Perpetual energy – this concept came to mind when you experience the atmosphere at Abba House and meet Elmien Claassen, managing director of SA Cares for Life, umbrella organisation for Abba House.

In December 2011 Reneé Pretorius and I had the humbling honour of presenting the amount of R61 172 raised at the Steel Awards 2011 dinner in Gauteng. We also took along gift bags for the small group of fixed and contract staff, who tirelessly tend to the babies in their charge. According to Elmien, these would bring a lot of cheer, especially considering that Abba House was in the process of moving to a smaller house and also had to reduce the staff on the payroll.

The need remains perpetual, but then we also witnessed people who were blessed with a bottomless capacity to care – like the one volunteer lady who arrived with a happy baby with little blonde ringlets on her hip – No. 58 to pass through her 'place of safety'!

Half the money raised will be allocated directly to Abba House. The balance will be allocated to other projects of SA Cares, which include pregnancy centres, early learning class rooms, parenting workshops and more community based initiatives. *Read more: www.sacares.net*

With the funds raised among guests at the Steel Awards 2011 dinner in Cape Town, we donated R5 355 to CHOC for their work among children suffering from life threatening diseases – the funds will be applied for projects in the Western Cape. *Read more: www.choc.co.za*

SAISC commends the diligent work of people directly involved with any of these projects and once again thanks every guest who participated in the lucky draw for the centre pieces and so helped us to spread some cheer.

Elmien Claassen (far left), Managing Director of SA Cares for Life, received the financial contribution of R61 172 and special gift bags for staff at Abba House from Marle Lotter of SAISC.

## SAISC AGM 2011

SAISC concluded the formal activities of 2011 on 10 November at the Country Club Johannesburg with multiple sessions for the executive bodies of the SAISC and its divisions, SASFA and ISF, culminating in the Institute's AGM and the release of the

Members of the SAISC Board for 2012.

Hennie de Clercq with Steve Cullender (Scottsdale Construction Systems SA) and other SASFA committee members at the SASFA yearend lunch at the Saxon Hotel on 1 December.

Annual Report* for 2011. Hercu Aucamp, MD of AVENG Trident Steel was the guest speaker at the concluding cocktail function, providing some interesting perspectives of the past and current state of our industry with even some projections for the future.

**The following persons will serve on the Board of SAISC in 2012:**

Hercu Aucamp, Ricardo Avellini, Hannes Basson, Jean Charoux, Kobus De Beer, Hennie De Clercq (Executive Director), Spencer Erling, Jim Guild, Brent Harris, Freddie Herselman, Sunil Kumar, Mike Lomas (Chairman), Pieter Nortjé, Neil Penson, Eileen Pretorius, Dodds Pringle, Malcolm Royal, Laurence Savage, John Swallow, Tim Tasioulas, Paolo Trinchero, Neels Van Niekerk

**SASFA Exco members for 2012:**

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**The Board of ISF for 2012:**

Hannes Basson, Francis Braz, Kobus De Beer, Hennie De Clercq, Spencer Erling, Kobus Marais, Eileen Pretorius, Dodds Pringle, Paolo Trinchero, Neels Van Niekerk (Director), Alan Van Rooyen, Bryan Wilken.

*Copies of the 2012 Annual Report were mailed to all SAISC members and can be requested from the SAISC office.

## SASFA YEAR-END CELEBRATION

SASFA committee members celebrated the industry accomplishments of 2011 with lunch at the Saxon Hotel on 1 December. Under guidance of Len Lategan (Innosteel) guests enjoyed a brief tour of the very elegant residential units on the premises where light steel frame construction was implemented. The tour meandered through the impressive skywalk that received the ASTPM Tubular Category Award at Steel Awards 2011.

## FUTURE EVENTS

**SAISC Golf Day 2012**

Reserved at Houghton Golf Club for 9 May – please mark the date in your diary, especially if you wish to give reigning champs, a run for the cup! Invitations for fourballs and sponsors will be sent out early in March to SAISC members – email marle@saisc.co.za if you wish to be added to the invitation list.

**Steel Awards 2012**

**Project entries – deadline for submission:** 30 April 2012;
Enquiries: renee@saisc.co.za

**Awards dinner:** 6 September 2012 in Gauteng, Cape Town & Durban;
Enquiries: marle@saisc.co.za

## THE EDITOR APOLOGISES

**In Steel Construction No. 6 2011, the editor made not one but three errors (including swapping the identities of the Stolz brothers) with the captions of the following photos in the Midvaal Structures profile on pages 6 to 8. Groveling apologies.**

Rudi Stolz.

Mario, CEO, and his brother Rudi (right).

A Midvaal Project: FSF Engineering, Vanderbijlpark.

# Midvaal Structures

BEE Level 5 BWO company





## WE ARE THE PROUD OWNERS OF THE ONLY PYTHON X-(7AXIS ROBOTIC PLASMA CUTTING MACHINE) STRUCTURAL FABRICATION SYSTEM IN SA

We recently purchased an Ajan 3000 High Definition Plasma table, with HP260 Generator and Jet Filter. This machine enables us to do our own inhouse cutting of Base plates and Connecting plates.

Plasma Table

Madupi Power Station

Python X

Madupi Power Station

- Offers an in-house detailing and architectural studio to assist customers from the early design stages right up to the final construction of their steel construction project.
- Works with a variety of roofing solutions, from small portal frame-type structures, through to 60-metre-span lattice girder designs.
- Mainly serves the commercial and industrial markets, with smaller contracts in the domestic market.
- Exports its solutions to various African countries – including Angola, Mozambique, Malawi, the Democratic Republic of Congo, and Swaziland.

**Midvaal Structures specialise in the cost effective building of steel structures for churches, factories, warehouses, hangars, shopping centres and offices.**

WE ARE ISO 9001 APPROVED AND A PROUD MEMBER OF THE SAISC
WE PRIDE OURSELVES IN HONESTY AND INTEGRITY

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